■ Composite photo showing a drum of chemicals being put through a variety of handling motions by the Baker "Octopus."

THE BAKER-RAULANG CO. 1853 100th ANNIVERSARY 1953 THE BAKER-RAULANG CO.

This BAKER TRUCK handles any shape load...

and stacks it in any position!

■ You name the load—the Baker "Octopus" illustrated will handle it, whether it's a drum, a roll of newsprint, a packing case, a piece of machinery, a bale of cotton or a pallet load of cartons. Moreover, it will pick it up, transport it, raise or lower it, shift it to left or right, revolve it, up-end it, or stack it in any position. In fact, it will handle it with no more physical effort than is needed to operate the simple hydraulic controls.

The "Octopus" consists of a standard Baker Fork Truck equipped with a variety of Baker attachments—360° revolving head, 4-purpose carriage, up-ender, drum clamp, etc.—which may be applied individually or in combinations. While one truck may never be called on to perform all these functions, the "Octopus" demonstrates the range of utility of Baker fork trucks and attachments.

write for *6-page special report on the application of Baker attachments to various loads.*

Baker

industrial trucks

THE BAKER-RAULANG COMPANY
1251 WEST 80th STREET • CLEVELAND 2, OHIO

BAKER-LULL Corporation, *Subsidiary*, Minneapolis, Minn.
Material Handling and Construction Equipment.

For more facts circle 502 on Reply Card

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'ROUND ABOUT with the editors in field and office

Edited by R. L. Marinello

A Traveling Turk Outdoes an Ambitious American

AMERICANS have a reputation for hustling, but even they have to occasionally take a back seat to a really experienced traveler. The following are excerpts from a letter by Lionel Northcroft of the Spirax Mfg. Co., Cheltenham, England:

"Phil Sprague (of The Hays Corp.) phoned from London so he and my co-director, Herbert Smith, had lunch together. I tried hard to persuade him to come down to Cheltenham, but like all Americans, he did not have the time!

"But one of the recent visitors we had here takes a record for things to be done in a day. He came from Turkey, traveled down from London in the morning, wanted to see our office and factory and go through our range of products, go to Stratford-on-Avon and see a Shakespeare play and get back to London by bus from Stratford so that he could see something of the countryside!"

New Hydraulic Group Formed in Philadelphia

RECENTLY 122 engineers and industrial executives in the Philadelphia area interested in hydraulic power systems met to form a new organization. The new organization will be affiliated with the ASME with the cooperation of the ASCE.

Activities of the group will be described by the term "fluid power systems." Two meetings with outstanding speakers have already been arranged; the first on February 18 and another on April 8. All persons interested in the subject are invited to attend. There is no obligation to hold membership in any engineering society.

Those interested in further details should contact the Chairman of the Organization Committee, J. S. Bennett, Vice President, American Engineering Co., Philadelphia.

This Month's Cover

PICTURE on the cover — courtesy of Bethlehem Steel Company — shows a spreader and its chain release in use at the Bethlehem plant. This mechanism permits them to release loads electrically without exposing workmen to the hot billets. This is just one example of the many safety features helping Bethlehem to produce more steel—safely.

Industrial Water for New Plants

PUBLICATION OF THE first three of nine preliminary reports containing data on the public water supplies of more than 1,200 cities, has been announced by the Dept. of the Interior.

The series will review the quality of water furnished to the larger cities of each state. Individual sectional reports are now being printed as circulars.

Readers interested in obtaining the three available reports should write to Chief of Distribution, Geological Survey, Washington 25, D. C., for: Circular 197, "The industrial utility of public water supplies in the East South Central States, 1952"; Circular 203, "The Industrial utility of public water supplies in the Mountain States, 1952"; and Circular 206, "The industrial utility of public water supplies in the West Central States, 1952."

Corrosion Conference

THERE WILL BE three educational lectures on corrosion fundamentals during the March 16 to 20, 1953 Chicago Conference of the National Association of Corrosion Engineers. This is in addition to the eleven symposia and two round-table discussion programs. This conference will be held at the Sherman Hotel, Chicago.

Readers interested in more information on this meeting should contact A. B. Campbell, Executive Secretary, National Association of Corrosion Engineers, 1061 M & M Building, Houston 2, Texas.

Construction News of New Plants

Ralph N. Brodie Co., Inc., recently completed an extensive new plant in the San Leandro, Calif., industrial

(Continued on page 6)

Plant Engineering is published monthly at Chicago, Ill. Subscriptions one year $10 in the U. S. A. Canada $11; Elsewhere $12. Acceptance under Section 34.64, P. L. & R. authorized by Post Office.

Install Kaylo Roof Deck -Get These Advantages...

LIGHT WEIGHT

With its weight of *only* 6 pounds per square foot, a Kaylo roof deck can be supported by a lighter structure—saves structural steel. Ease of handling and placing speeds up work and saves on construction costs.

HIGH STRENGTH

A Kaylo deck will support a total load of 50 pounds per square foot, with a high safety factor approved by leading code authorities.

INSULATING VALUE

Kaylo Roof Deck is hydrous calcium silicate with insulating value equal to one and one-half inches of standard insulation board.

FIRE-SAFETY

Kaylo Roof Deck is rated incombustible by Underwriters' Laboratories. The slabs alone can withstand fire for more than three hours.

LIGHT REFLECTIVITY

The smooth, underside of a Kaylo roof deck makes a *completed* ceiling that reflects more than 80% of the light striking it, even without painting or other treatment.

FAST, ECONOMICAL CONSTRUCTION

A Kaylo deck can be constructed in only three steps—installing the sub-purlins, laying the Kaylo roof slabs and grouting the end joints. The deck is then ready for covering with standard built-up roofing materials.

PROMPT DELIVERY ON KAYLO ROOF DECK!

Last year, despite continuous expansion of our manufacturing facilities, demand for this superior roof deck material far exceeded our ability to produce it. Now, with our increased production, you can specify Kaylo Insulating Roof Deck and get delivery—promptly.

WRITE FOR FREE BOOK—"Kaylo Insulating Roof Tile." Address: Dept. N-395, Owens-Illinois Glass Company, Kaylo Division, Toledo 1, Ohio.

KAYLO® ...first in calcium silicate

...pioneered by OWENS (I) ILLINOIS Glass Company

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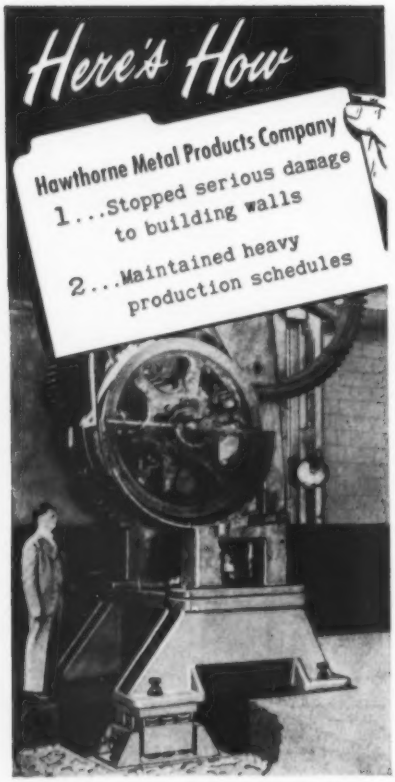

Here's How
Hawthorne Metal Products Company
1...Stopped serious damage to building walls
2...Maintained heavy production schedules

Huge 600 ton capacity press weighing 100,000# at Hawthorne Metal Products Company, Royal Oak, Michigan. Special 25,000# capacity Korfund Steel Spring Vibro-Isolators installed directly under the press weigh 600# each.

..by controlling shock

Shock from this big press was cracking building walls. To maintain heavy production schedules, this condition had to be remedied — fast.

Korfund's Detroit representative was called in, analyzed the problem, and 'phoned in the important data to the Korfund factory. Korfund engineers immediately started designing and building the special Isolators.

Seven days later, they were shipped!

This press has now been in daily operation for over a year, and shock transmission to the building has been completely eliminated. Yet the 100% effective Korfund Isolators cost less than 3% of the press cost.

For less critical installations, there are even less expensive standard stock Isolators. A Selector Chart in Bulletin G-104 gives recommendations for both normal and critical conditions. See Sweet's Catalog Files, or write us for your free copy today.

We'll gladly submit recommendations, without obligation. A half century of experience is at your disposal.

Representatives in Principal Cities

KORFUND SPRINGS RUBBER CORK

THE KORFUND COMPANY, INC.

48-35th Thirty Second Place • Long Island City 1, N. Y.

For more facts circle 504 on Reply Card

Construction News of New Plants

(Continued from page 4)

area . . . **Pittsburgh Plate Glass Co.** has opened a new paint manufacturing plant at East Point, Georgia . . . **Triangle Conduit & Cable Co., Inc.** is entering the copper and brass tubing field with construction of a new mill at New Brunswick, New Jersey . . . **The Permutit Co.,** in addition to expansion of the Birmingham, New Jersey works, is planning further extensions and improvements, including a new laboratory and pilot plant . . . **Jefferson Electric Co.** is constructing an addition to its plant in Bellwood, Illinois . . . **Aluminum Company of America** will build a new fabricating plant in Lancaster, Pennsylvania, for production of aluminum screw machine products, fasteners, rivets and nails . . . **Lockheed Aircraft Corp.** has completed the master plan for a multi-million dollar jet flight center to be built at Palmdale, California . . . **Armco Drainage & Metal Products, Inc.** is constructing a fabricating plant at Mansfield, Pennsylvania . . .**General Electric Co.** is building a new service shop and warehouse in the Philadelphia area . . . **Farmers Engineering and Manufacturing Co.** is starting production in its new plant at Irwin, Pennsylvania . . . **Air Reduction Co., Inc.** is expanding its calcium carbide plant at Calvert City, Kentucky . . . **Amana Refrigerations, Inc.** plans a 3½ million dollar expansion program, that will double the size of its plant at Amana, Iowa, and treble production.

Packaging Exposition

THE FOUR-DAY National Packaging Exposition, sponsored by the American Management Association, will be held at Navy Pier, in Chicago, April 20 to 23.

A packaging conference will be held concurrently with the exposition. The conference will be devoted mainly to consideration of a broad range of topics relating to packaging management and technique, including the problems of merchandising, industrial packaging, high speed production line packaging and training of personnel. Special attention will be given to the packaging problems of specific industries.

Want to Rent a Conveyor?

MANUFACTURERS, WHOLESALERS, and retailers can now lease conveying equipment ranging from a single inter-floor belt conveyor to a complete materials flow system engineered to handle goods through all phases of plant and warehouse operations. The lease plan is currently available in the Chicago, Philadelphia, New York, Buffalo and Grand Rapids, Michigan, areas.

Under the plan, conveying equipment is installed for a mutually agreed-on charge. A fixed monthly sum covers use of the equipment. Insurance, maintenance, repair and personal property tax are paid by the conveyor manufacturer.

Leases under the agreement are set up for a ten year period. The monthly rental is reduced substantially after each 3-year period the equipment is in use following installation.

Firms interested in details of the conveying equipment lease plan may get full information by writing to The Rapids-Standard Co., Inc., 507 Plymouth Road, N.E., Grand Rapids, Michigan, or by contacting the company distributor in their territory.

'ROUND ABOUT

Materials Handling Show

THE FIFTH National Materials Handling Exposition will be held at Convention Hall, Philadelphia, from May 18th to 22nd. In addition to a series of materials handling conferences, many companies will exhibit equipment of mechanical handling.

Advance registration cards and hotel information may be obtained from Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y.

Technical Aid Leaflets

UP-TO-DATE technical information designed to aid small firms engaged in machining brass and bronze is contained in a new leaflet issued by the Small Defense Plants Administration.

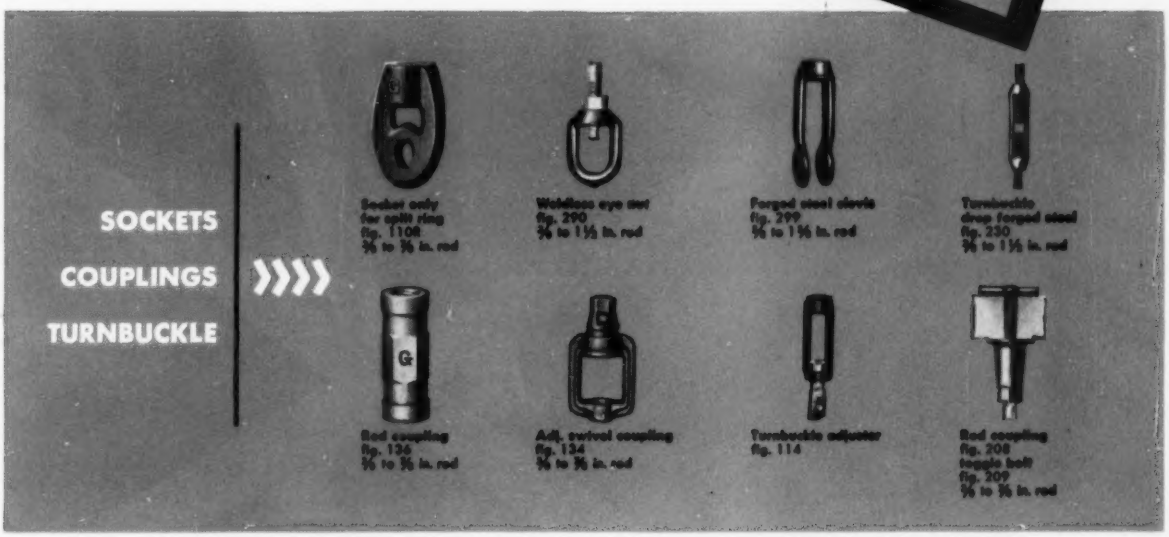
The leaflet, "Machining Brass and Bronze Workpieces," is No. 15 in the series of helpful leaflets issued by the SDPA's Management Service Division, and is available free on request from SDPA field offices.

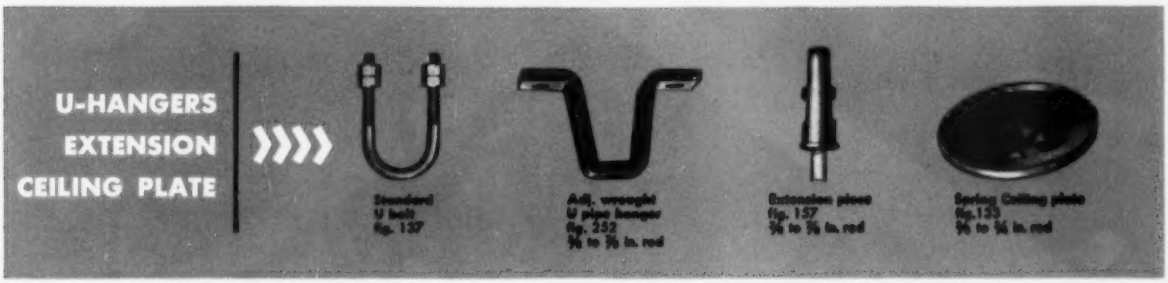
Other leaflets in the technical aids series are: Proper Alignment of Machine Tools; Sharpening of Drills, Lathe Tools and Milling Cutters; Care of Belt, Chain and Gear Drives; Sharpening Certain Metal Cutting Tools Used in Machine Shops; Precision Measurement of Workpieces; Selecting the Right Tool Steel; Machining Aluminum—I and II; Metallizing; Machining Plastics—I and II; Machining, Repairing and Heat Treating Cast Iron Workpieces; Cutting Oils and Coolants; Corrosion in Machine Shops—Cause and Prevention. These helpful leaflets may be obtained by writing to Small Defense Plants Administration, 1337 E. Street, N.W., Washington, D. C., or to your local SDPA field office.

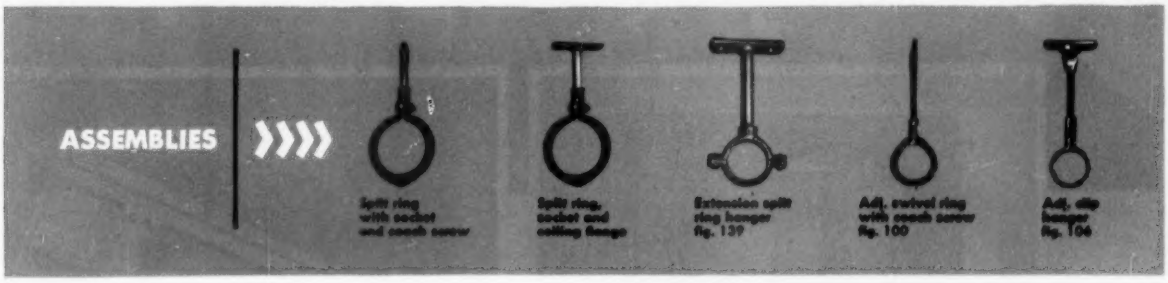
ADJUSTABLE PIPE HANGERS AND SUPPORTS

for every piping requirement

NO. 5 OF A SERIES SHOWING THE GRINNELL LINE


SOCKETS
COUPLINGS
TURNBUCKLE
Socket only for split ring fig. 1108 ⅜ to ⅞ in. rod
Weldless eye nut fig. 290 ⅜ to 1½ in. rod
Forged steel clevis fig. 299 ⅜ to 1⅛ in. rod
Turnbuckle drop forged steel fig. 230 ⅜ to 1½ in. rod
Rod coupling fig. 136 ⅜ to ⅞ in. rod
Adj. swivel coupling fig. 134 ⅜ to ⅞ in. rod
Turnbuckle adjuster fig. 114
Rod coupling fig. 208 toggle bolt fig. 209 ⅜ to ⅞ in. rod


U-HANGERS
EXTENSION
CEILING PLATE
Standard U bolt fig. 137
Adj. wrought U pipe hanger fig. 252 ⅜ to ⅞ in. rod
Extension piece fig. 157 ⅜ to ⅞ in. rod
Spring Ceiling plate fig.135 ⅜ to ¾ in. rod


ASSEMBLIES
Split ring with socket and coach screw
Split ring, socket and ceiling flange
Extension split ring hanger fig. 139
Adj. swivel ring with coach screw fig. 100
Adj. clip hanger fig. 104

Call your local Grinnell Distributor, or write for Hanger Catalog.

GRINNELL

AMERICA'S #1 SUPPLIER OF PIPE HANGERS AND SUPPORTS

Grinnell Company, Inc., Providence, Rhode Island • Coast-to-Coast Network of Branch Warehouses and Distributors

Manufacturer of: pipe fittings • welding fittings • forged steel flanges • steel nipples • engineered pipe hangers and supports
Thermolier unit heaters • Grinnell-Saunders diaphragm valves • prefabricated piping • Grinnell automatic fire protection systems

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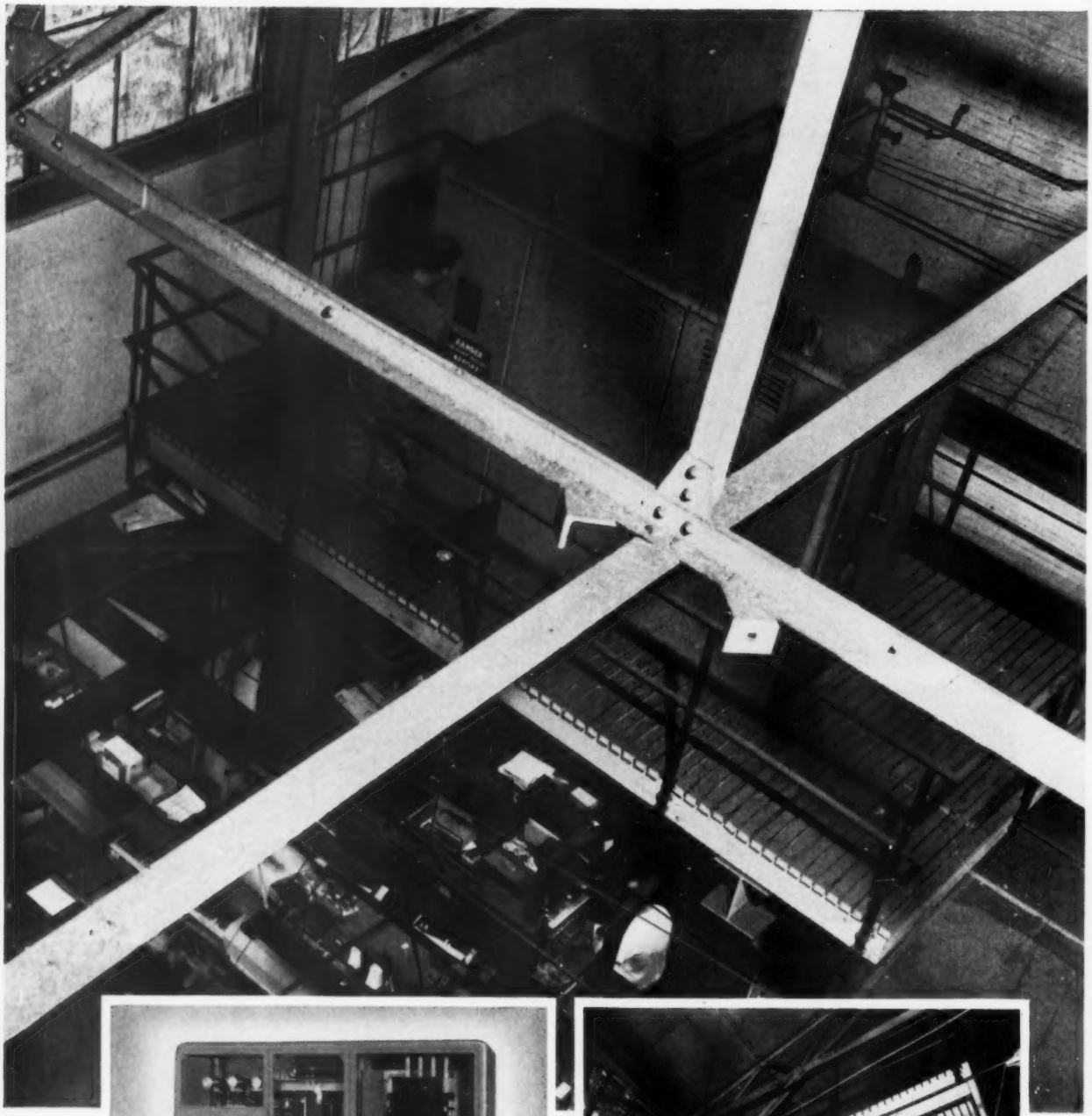
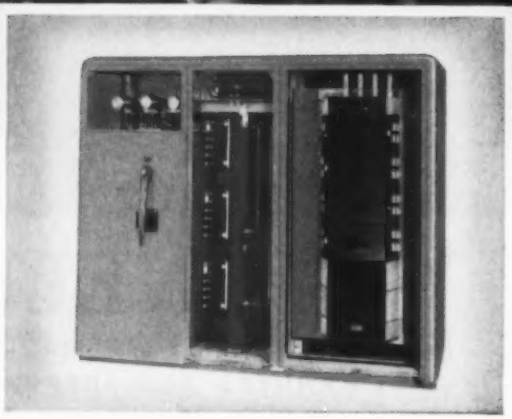
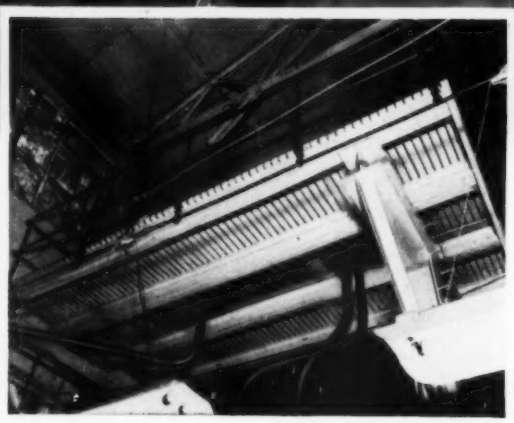
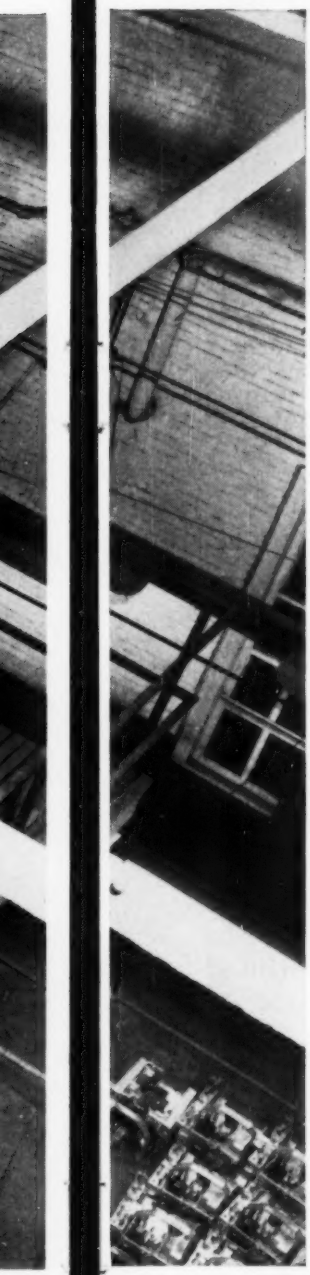




BUILT-IN PROTECTION Separately mounted protective devices are eliminated. Factory-assembled Westinghouse Power Centers offer complete substation protection.



EASY TO INSTALL Floor view of completely enclosed unit. Westinghouse Dry-Type Power Centers are safe . . . to hook up, simply connect high and low-voltage leads.



How Westinghouse Power Centers release space for production

Confronted with the need to modernize his electrical distribution system, an eastern radio and electronics manufacturer installed four Westinghouse Dry-Type Power Centers on overhead platforms, releasing much needed floor space for production.

Change-over from the old system was accomplished section by section, without interrupting production. Each 300-kva integral Power Center, completely assembled, was spotted overhead, close to the center of the load it would serve. Secondary runs were thus shortened, resulting in lower line losses, better regulation, and increased productive capacity of the machinery.

As the old conventional equipment in floor-level vaults was dismantled, additional productive equipment was moved in. The entire change-over was accomplished in 60 days.

Westinghouse Dry-Type Power Centers can bring savings like this to your plant, too. With all protective equipment factory co-ordinated and assembled as a unit, they can be installed quickly and easily. Air cooled, they are safe and eliminate most maintenance headaches. For further information, contact your Westinghouse representative, or write direct to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh, Pennsylvania. J-70655

YOU CAN BE SURE...IF IT'S

Westinghouse

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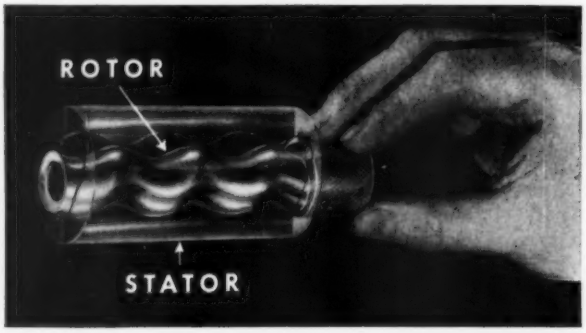
HOW IT WORKS

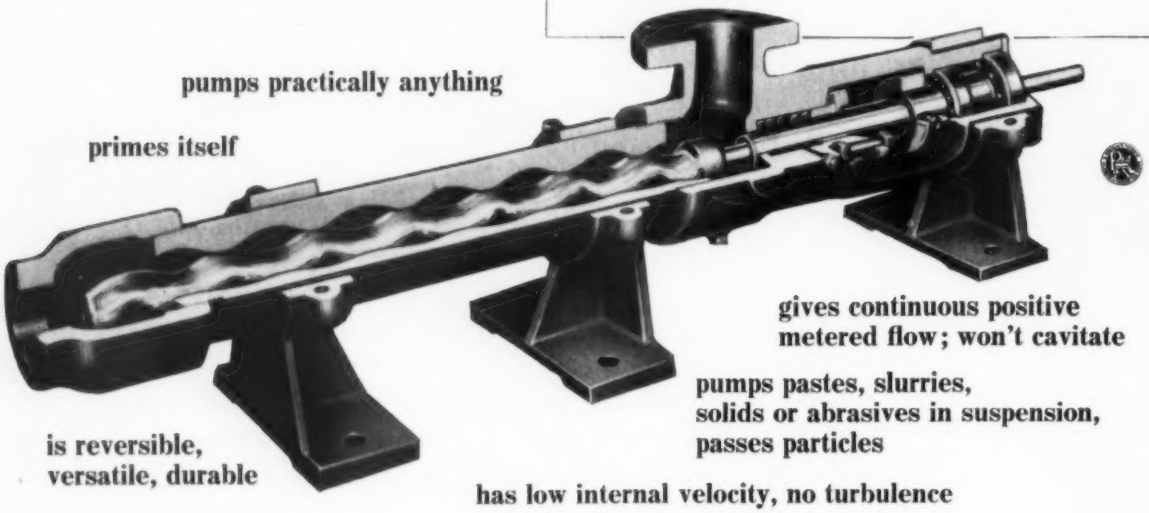
shows why the MOYNO has all these Advantages:



Rotor and Stator Form the Progressing Cavities

Rotor might be described as a stretched-out corkscrew. The stator is like it but has a *double* internal thread. As shown in the illustration, the rotor and stator thus form closely fitted cavities. As the rotor revolves, the material constantly moves or progresses within these cavities toward the discharge end.

Thus material is moved quietly and steadily, with a minimum of turbulence. And because of these cavities, the material may be a paste; it may contain solids in suspension; abrasive slurries are no problem. That is why Moyno pumps can move practically anything that will pass through a pipe.



pumps practically anything

primes itself

gives continuous positive metered flow; won't cavitate

pumps pastes, slurries, solids or abrasives in suspension, passes particles

is reversible, versatile, durable

has low internal velocity, no turbulence

Moynos solve many pumping problems. They will handle acids and alkalis, hot or cold materials, liquefied gases. They'll handle practically anything you can think of as pumpable, and handle difficult jobs better than any pump we know.

Moynos are available in a wide variety of types and sizes and materials, with displacements up to 250 gallons per minute, pressures up to 1000 p.s.i. And you'll be amazed at their small sizes, their high efficiency, their long, trouble-free operation.

Get this free bulletin No. P30BE.

Details, specifications, and a more complete explanation of how Moyno pumps work and what they can handle. Call the nearest R&M Moyno man, or write Robbins & Myers for a copy.

R & M MOYNO® PROGRESSING-CAVITY PUMP

ROBBINS & MYERS, INC.

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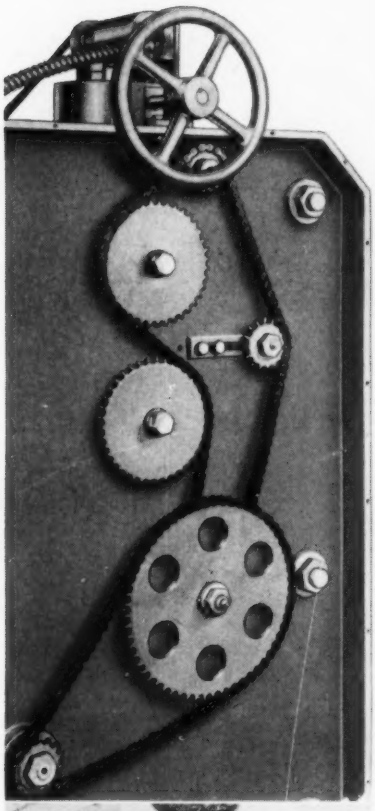
Only Roller Chains

Can Offer Such Wide Adaptability



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- √ *Operate Any Number of Shafts*
- √ *Simplify Selection of Shaft Locations*
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- √ *Maintained Speed Ratios*
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PITCH HOLE PREPARATION

Maximum rigidity of links insured by special pitch hole preparation for 100% effective bearing area of pin and bushing. Longer life, smoother operation.

SHOT-PEENING SINCE 1944

Diamond Chain has long recognized that certain types of internal stressing of chain parts would increase fatigue resistance. To this end, link plates have been specially processed and chain rollers and other parts have been shot-peened since 1944.

• Diamond Roller Chains engage sprockets equally well on either side, providing the design engineer with great flexibility as to the number of shafts driven from one driver, the driven shaft locations and direction of rotation. Size of sprockets determine speeds as desired.

Our engineering staff is ready to make recommendations.

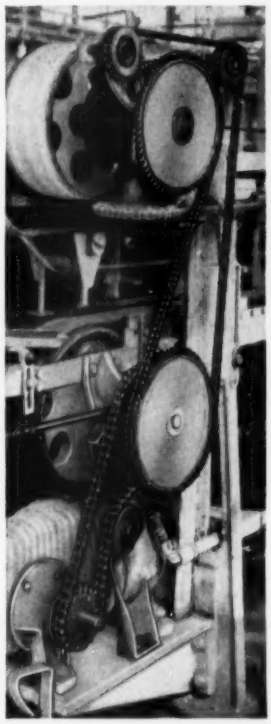
DIAMOND CHAIN COMPANY, Inc.

Where High Quality is Tradition

Dept. 614, 402 Kentucky Avenue, Indianapolis 7, Ind.

Offices and Distributors in All Principal Cities

Refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER



DIAMOND ROLLER CHAINS

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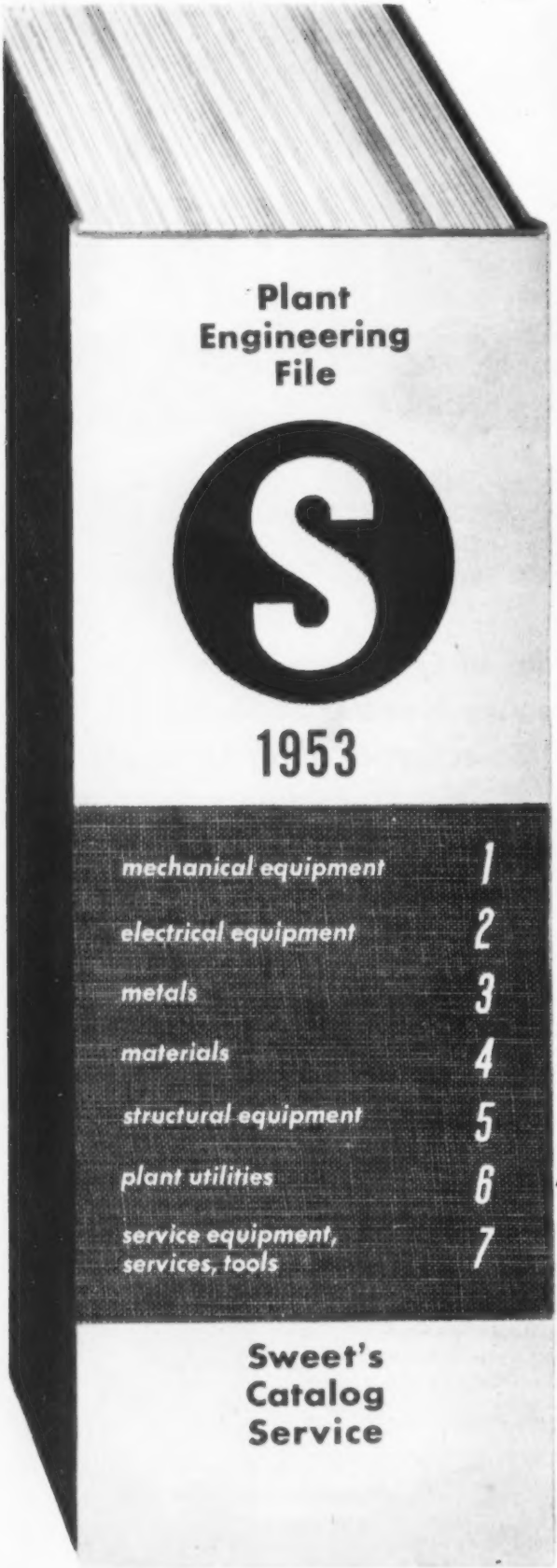

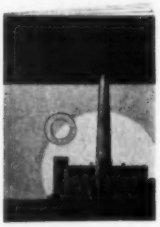

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"... a great time saver."

your Plant Engineering File

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The other sections of this File contain additional catalogs covering a wide range of materials and plant equipment . . . useful information on products used in the maintenance of all plant facilities and services to production.

This collection of 252 manufacturers' catalogs is grouped in sections according to products, or use of products, so that you can readily compare one product with another. Indexes of manufacturers, products and trade names lead you quickly to the catalogs you are looking for.

Sweet's is working constantly to get more manufacturers to send you their catalogs in this easy-to-use form. If you fail to find what you want, please tell us.

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EASY OPERATION OF ULTRASONIC CLEANING ELIMINATES CUMBERSOME BATHS AND TIME SPENT HANDLING PARTS

Parts cleaning time slashed 80%

Bearings cleaned faster, more thoroughly, by G-E Ultrasonic Generator

50 PRECISION PARTS can be placed in the beaker and cleaned in less than one minute with ultrasonics

Miniature Precision Bearings, Inc., of Keene, New Hampshire, pioneer manufacturers of precision ball bearings in miniature sizes, has reduced cleaning time of ball-bearing parts by more than 80% by adopting a General Electric Ultrasonic Generator.

In manufacturing these small bearings, each part must be measured and tested many times during fabrication. This manufacturer formerly used forced-air cleaning and time-consuming hand dipping to clean components. Now, with ultrasonic cleaning, fifty parts can be cleaned by one operator in less than one minute to meet rigid inspection—cutting rejects of assembled bearings.

G-E Ultrasonic Generator has been found increasingly effective for cleaning of small parts; cleans in inaccessible corners, small holes, and wherever complicated shapes exist.

For further information about applying ultrasonic energy for cleaning contact your nearest G-E Apparatus Sales Office, or write for Bulletin GEA-5669 to General Electric Co., Section 687-115, Schenectady 5, New York.

You can put your confidence in—

GENERAL ELECTRIC

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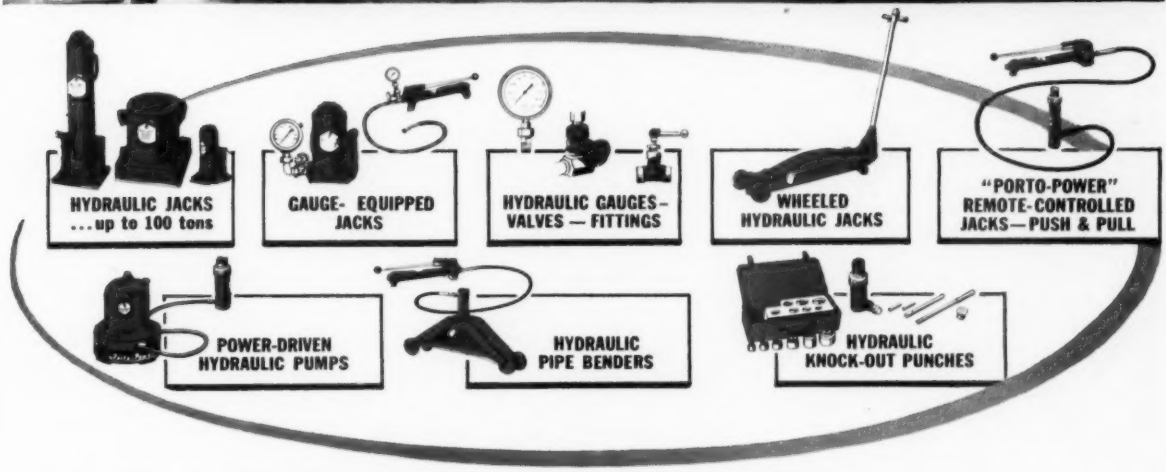
Pick the right jack for the job...

...from the world's most complete line of hydraulic equipment

Here's 50 tons of power that'll work in a mighty tight spot! *One man* with easy effort on a *short handle* exerts 100,000 lbs. of jack action. Yet this compact GB-11 Hydraulic Jack weighs only 111 lbs. *Don't do it the hard way — do it the hydraulic way!*

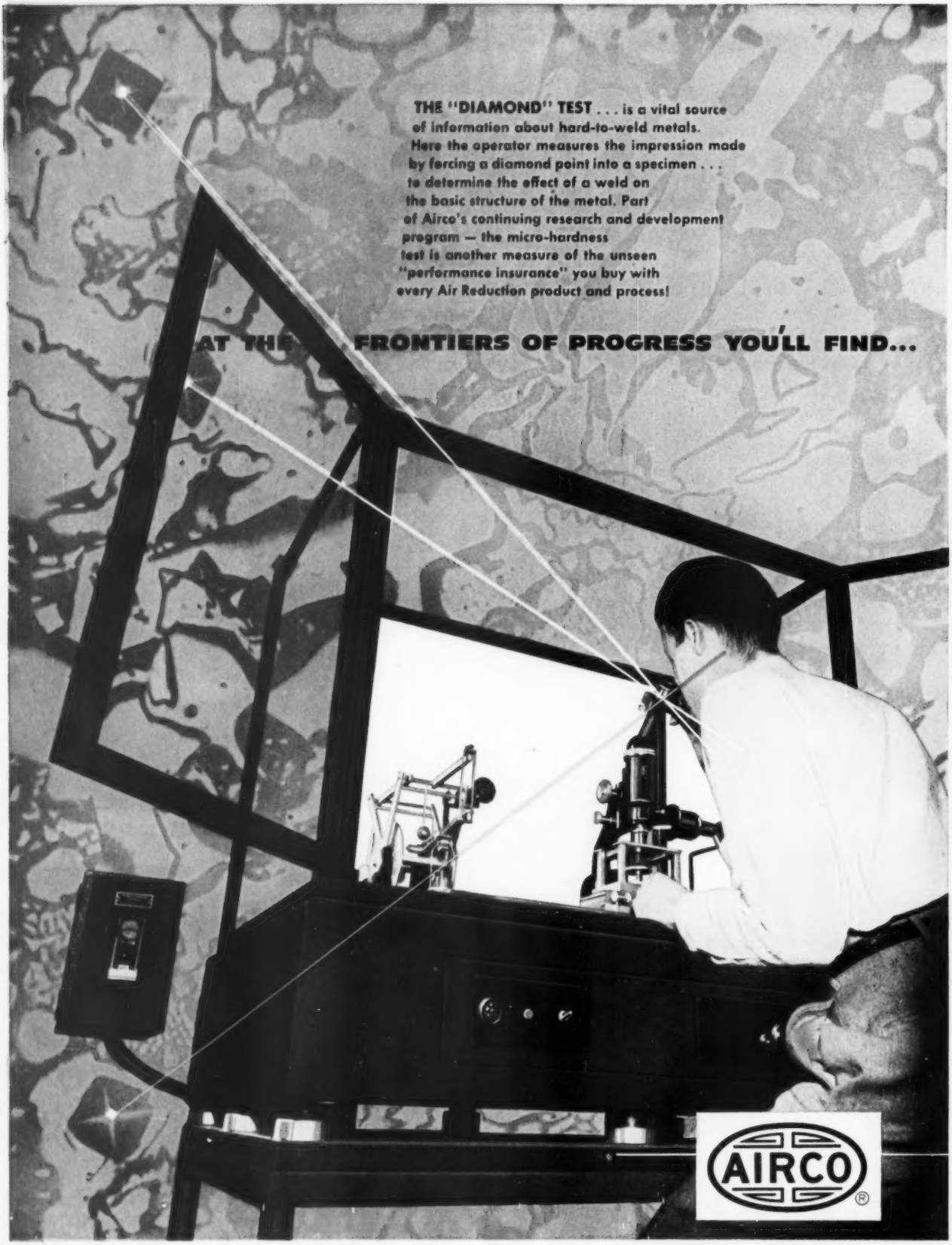


YOU GET ALL THESE HYDRAULIC TOOLS ONLY FROM BLACKHAWK

BLACKHAWK

Sold by leading distributors. Write for catalogs. Blackhawk Mfg. Co., Dept. J-4923, Milwaukee 1, Wisconsin.

For more facts circle 511 on Reply Card


THE "DIAMOND" TEST . . . is a vital source of information about hard-to-weld metals. Here the operator measures the impression made by forcing a diamond point into a specimen . . . to determine the effect of a weld on the basic structure of the metal. Part of Airco's continuing research and development program — the micro-hardness test is another measure of the unseen "performance insurance" you buy with every Air Reduction product and process!
AT THE FRONTIERS OF PROGRESS YOU'LL FIND...
AIRCO

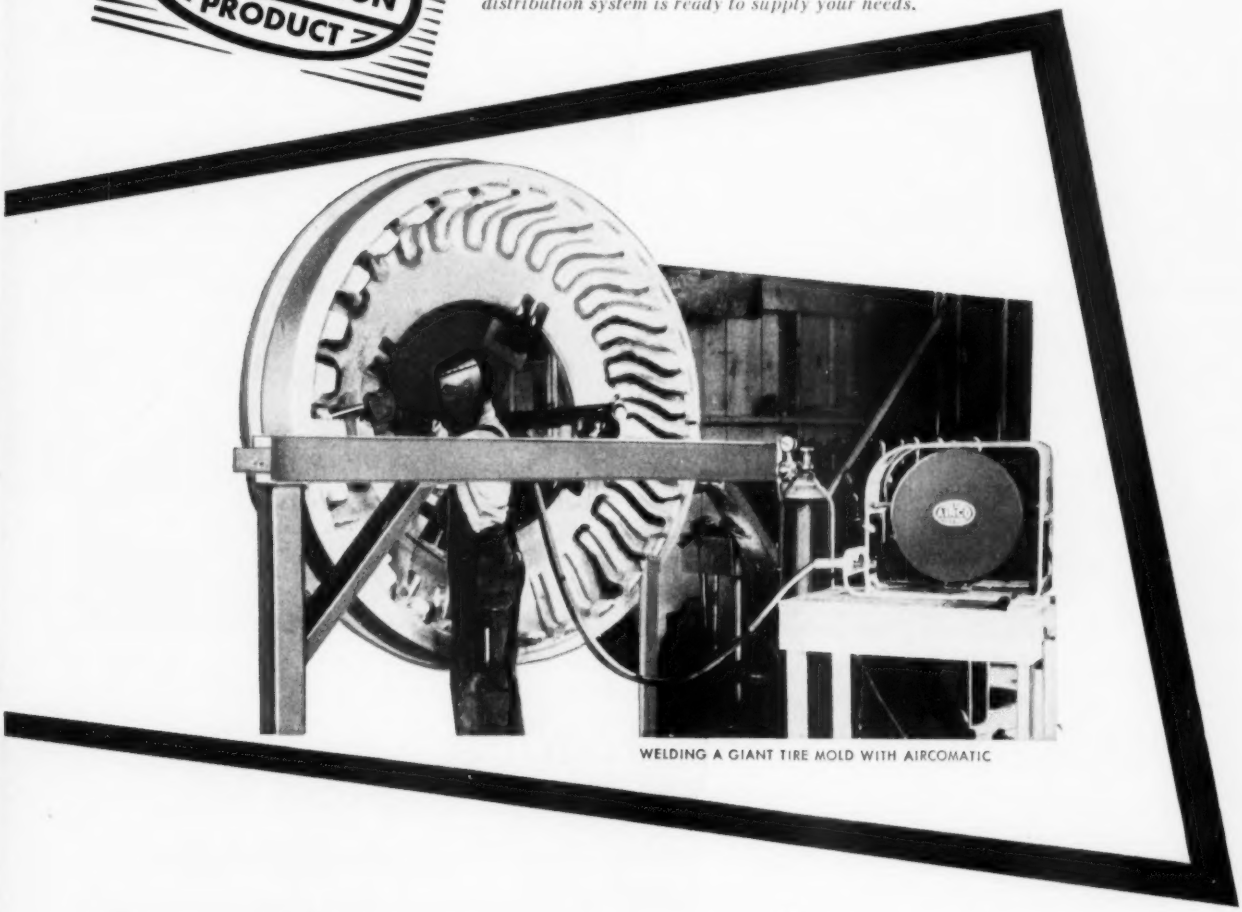
OXYGEN • ACETYLENE • INDUSTRIAL AND RARE GASES • CALCIUM CARBIDE • WELDING SUPPLIES AND ACCESSORIES

"welding" a perfect tread...

AIRCOMATIC® inert gas welding once again demonstrates its ability to handle problem metals in this unique application. A prominent manufacturer of aluminum molds for recapping tires ran into "tread trouble" when attempting to cast tread lugs into the doughnut-shaped tire matrix. Clearance between lug and matrix left an unsightly rubber "fin" on the finished product. The Aircomatic process eliminated this problem with clean, non-porous welds . . . at the same time speeding production through its high-rate deposition of filler metal. No flux was necessary . . . no slag removal . . . minimum "clean-up" on the finished matrix.

... AN AIR REDUCTION PRODUCT

And remember, when you need oxygen, acetylene, other industrial or rare gases, think of Air Reduction. A nation-wide distribution system is ready to supply your needs.



WELDING A GIANT TIRE MOLD WITH AIRCOMATIC

AIR REDUCTION

DEALERS AND OFFICES IN MANY PRINCIPAL CITIES

60 East 42nd Street • New York 17, N. Y.

Air Reduction Sales Co. • Air Reduction Magnolia Co. • Air Reduction Pacific Co.

Represented Internationally by Airco Company International

Divisions of Air Reduction Company, Incorporated

• OXYACETYLENE WELDING AND CUTTING APPARATUS • ARC WELDING AND INERT-GAS ARC WELDING EQUIPMENT

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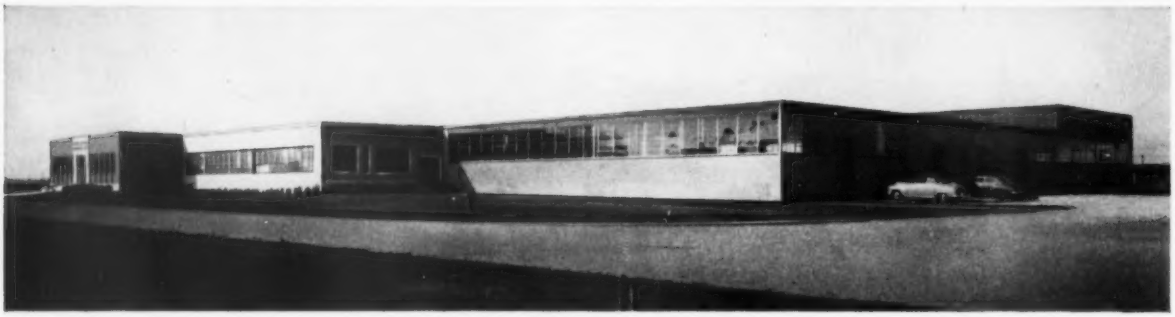
GOULD OPENS 21ST PLANT

TO MEET INDUSTRIAL BATTERY DEMAND



Front and side views of Gould's new Kankakee, Ill., plant

GOULD'S NEW KANKAKEE PLANT which went into production on November 10 is the 21st Gould plant in the United States and Canada. Devoted entirely to the manufacture of storage batteries for industry, it gives Gould the additional capacity necessary to meet the increased demand for Gould batteries in all parts of the country. Thanks to these new facilities, Gould customers can expect even faster service than before.

GOULD *Industrial Batteries*

GOULD-NATIONAL BATTERIES, INC., TRENTON 7, N. J.

Always Use Gould-National Automobile and Truck Batteries

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Remember — the trade marks "tt" and "TUBE-TURN" are applicable only to products of TUBE TURNS, INC.

Engineered FOR MINIMUM PRESSURE DROP

THIS TUBE-TURN Welding Elbow has full radius conforming to A.S.A. Standard B 16.9. The radius is not reduced by tangents. The interior walls are consistently smooth and perfectly circular . . . important production features which minimize pressure drop.

This attention to engineering detail pays off in your piping systems. When you specify TUBE-TURN Welding Fittings and Flanges, pressure drop is at a minimum and uniformity of fit-up is assured.

You'll find a TUBE TURNS' Distributor in every principal city. Call him for good service in good connections.

Be sure you see the double "tt"

TUBE TURNS, INC. LOUISVILLE 1, KENTUCKY

DISTRICT OFFICES: New York · Philadelphia · Pittsburgh · Chicago · Houston · Tulsa · San Francisco · Los Angeles

Wholly owned subsidiaries: TUBE TURNS OF CANADA LIMITED, CHATHAM, ONTARIO

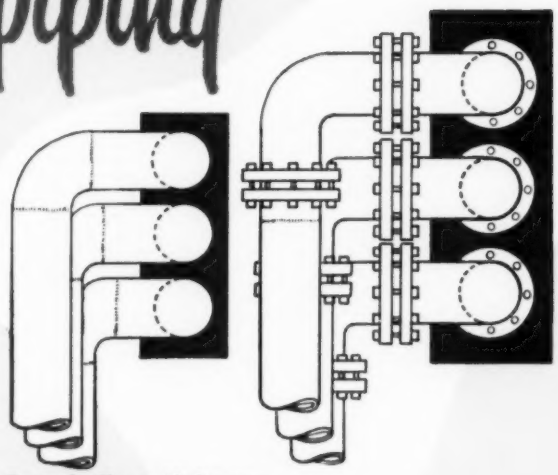
PENNSYLVANIA FORGE CORPORATION, PHILADELPHIA, PA. · KEROTEST MANUFACTURING COMPANY, PITTSBURGH, PA.

COMPACT WELDED PIPING SIMPLIFIES THE JOB

COMPACT *Welded piping* SIMPLIFIES THE JOB

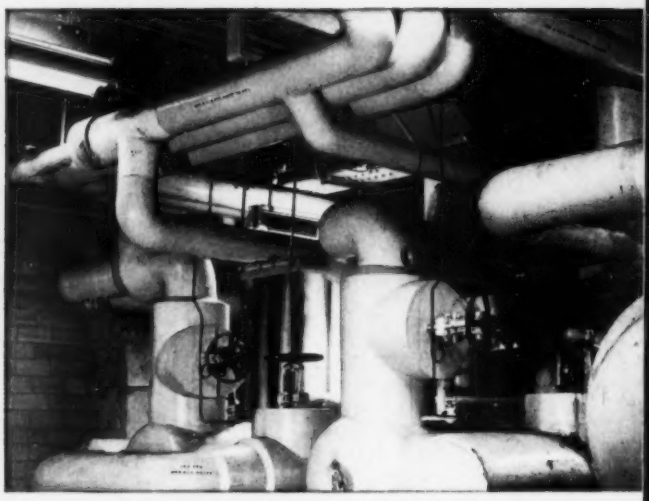
You can simplify design, save valuable space and speed up the piping job by specifying *welded construction* with Tube-Turn Welding Fittings. Welded joints are virtually flush with the pipe. Pipes can fit snugly together in tight corners . . . against wall or ceiling . . . or around equipment. And welded piping requires little elbow room to install . . . and to insulate. The true circularity and uniform wall thickness of Tube-Turn Welding Fittings simplifies fit-up and assures a job well done under crowded working conditions.

This is just one reason why it pays to specify *welded piping*. It's stronger, lighter, streamlined, economical to install, insulate and maintain.



Example: **The welded assembly on left takes a third less space than comparable flanged assembly.**

Bring on your tight corners! Entire sections of welded piping can be shop-fabricated and erected as a unit with a few simple tie in welds or flange connections to valves or containers.



In the new O. H. Hutchings Station of Dayton Power & Light Company. Piping for deaerators and feed water heaters is compact, streamlined and permanent. Directional changes are made with TUBE-TURN Welding Fittings.

Want Dimension Data?

Tube Turns, Inc. has compiled a handy folder of charts covering dimensions and weights of TUBE-TURN Welding Fittings and Flanges. If you'd like a free copy just send this coupon.

TUBE TURNS, INC., Dept. D-2
224 East Broadway, Louisville 1, Kentucky

Your name .....

Position .....

Company .....

Nature of business .....

Address .....

City ..... *State* .....

DISTRICT OFFICES

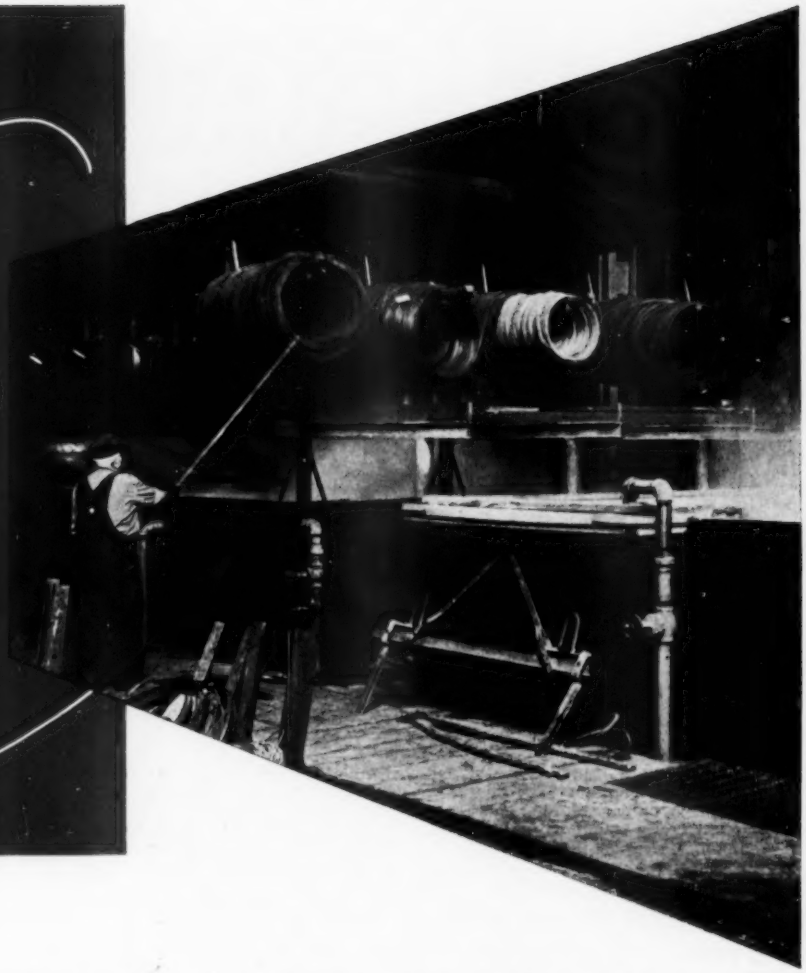
New York	Houston
Philadelphia	Tulsa
Pittsburgh	San Francisco
Chicago	Los Angeles

"tt" and "TUBE-TURN" Reg. U. S. Pat. Off.

TUBE TURNS, INC.

LOUISVILLE 1, KENTUCKY

Do You Have a Corrosion Problem as Tough as This?



If you have a tough corrosion problem, there's a good chance you'll find the solution in durable Pitt Chem Tar Base Coatings.

Pickling tank surfaces like these, for example, *really* take a beating from constant exposures to acid spillage, fumes, and condensation. But month in and month out, Pitt Chem Tar Base Coatings can provide economical, long-lasting protection against these and similar extreme corrosive conditions.

Pitt Chem Tar Base Coatings are easy to apply and up to ten times as thick as ordinary paints. No other material does such a complete job of protection at so little cost.

Why not drop us a line, *right now,* outlining your problem? We'll gladly provide you with our recommendations . . . or supply the technical literature or assistance you need.

WBD 4485

PITT CHEM 101
For severest corrosive conditions

PITT CHEM 102
A thin, high gloss maintenance coating

PITT CHEM 103
For metal exposed to vapors, dilute acids and alkalis

PITT CHEM 104
For equipment handling potable water

AND OTHER SPECIALTY COATINGS

PROTECTIVE COATINGS DIVISION

PITTSBURGH
COKE & CHEMICAL CO.

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COAL CHEMICALS • AGRICULTURAL CHEMICALS • FINE CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

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"THIS LUBRICANT SAVED US $2,098·16 IN SEVEN MONTHS"

—says THE BROWN COMPANY
Quality Paper Makers of Berlin, N. H.

"During a seven-month period before using LUBRIPLATE No. 130-AA in the bearing of our Kraft Mill Lime Kiln, we used a conventional oil at a cost of $2,134.00. In the seven months that followed, we used LUBRIPLATE No. 130-AA for initial filling and replacement at the cost of $35.84."

For nearest LUBRIPLATE distributor, see Classified Telephone Directory. Send for free 56-page "LUBRIPLATE DATA BOOK"... a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE COSTS.

For more facts circle 516 on Reply Card

BACKTALK ABOUT PAST ISSUES

Asks for More Details on Kaiser Make-Up Water Article

PLANT ENGINEERING:

"In the November issue you carried an article on make-up water at the Kaiser Steel plant of which I am very interested. I would desire a reprint of this article, plus the name of some person at the Kaiser Steel Co. who might be able to answer more detailed questions I have in reference to different processes in the above-mentioned article.

"Because of the number of problems we are now experiencing at our Milwaukee Works, this type of water make-up system appears attractive. Some of our major problems are a large water bill, sewage problem with the city, acid disposal and process water re-use." *Theodore E. Crawford, Plant Engineer, A. O. Smith Corp.*

Editor's Note: As if in answer to Crawford's letter, the very same day we received the following letter, informing us that the water system was designed and installed by the Kaiser Engineers Division of the company.

PLANT ENGINEERING:

"There has just come to my attention an article in the November issue on the water system at Kaiser Steel's Fontana plant. I am interested in getting some reprints of this article, 'Only 2.8 Per Cent Make-Up Water Required Daily at Kaiser Steel,' and I would appreciate your quoting prices as soon as possible.

"This water system was designed and installed for Kaiser Steel by Kaiser Engineers Division of Henry J. Kaiser Co., a fact of which we here in Kaiser Engineers are very proud. I understand you obtained material for this article directly from Kaiser Steel, and I am sorry that they did not point out our connection with the installation." *Ted Palmer, Public Relations, Kaiser Engineers, Division of Henry J. Kaiser Co.*

Request for Ball Bearing Article

PLANT ENGINEERING:

"We have received a request from our Plant Mechanical Department for 50 copies of 'Ball Bearings—Their Lubrication, Care and Replacement.' This article appeared in the October, 1952 issue on page 94." *Charles H. Clarke, Purchasing Dept., American Cyanamid Co.*

Two More Requests For Articles on Shop Offices

PLANT ENGINEERING:

"In reading the November, 1952 issue, page 24, I find that we have a problem similar to that of the American Car & Foundry Co. of supplying shop offices for foremen and would be pleased if you would send me tear sheets of the two articles mentioned." *A. W. Mathieson, Plant Engineer, General American Transportation Corp.*

PLANT ENGINEERING:

"Please send me a copy of 'Build Economy and Efficiency into Shop Offices' from the August, 1950 issue, and a copy of 'Shop Control Centers Can Be Clean, Cheap and Effective' from the June, 1951 issue." *T. A. White, Maintenance Foreman, Preco, Inc.*

Interested in PM Systems

PLANT ENGINEERING:

"The October, 1949 issue carried an article entitled 'Simplified Preventive Maintenance System' which was very interesting to us. This article also includes a small block at the end indicating that sample cards on this system would be available to readers upon request.

"We realize that this is a late date beyond the time that the article was published but at the same time if these sample cards are still available we would appreciate very much receiving them.

"If on the other hand there are more up-to-date systems available at the present time, we would be pleased to know about them and receive any sample or descriptive material covering such a system.

"We read your magazine with considerable interest and will appreciate any information or material which you can supply us on the above subject." *W. D. Rigg, Resident Engineer, Olympia Brewing Co.*

Words PE Likes to Hear

PLANT ENGINEERING:

"Please furnish us with tear sheets on the article entitled, 'Organizing for Maintenance' beginning on page 80 in the December, 1952 issue.

"We have been receiving your magazine for approximately 4 years now and find it to be of immeasurable help in keeping us current of new methods, equipments and practices in industrial plants." *Thomas C. Hanson, Production Manager, King Midas Feed Mills.*

For Readers Abroad

PLANT ENGINEERING:

"We are enclosing the 17 photographs which we borrowed from the July, August, and September issues of PLANT ENGINEERING to be used with digests of articles which appeared in these issues. The digests are appearing in several *Technical Digest* issues, copies of which are enclosed.

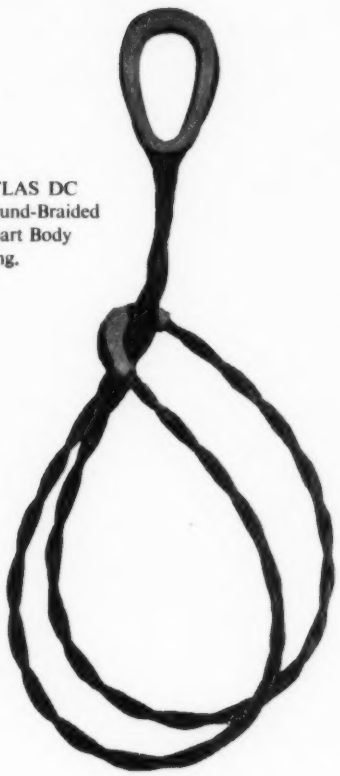
By means of the Digest Service it is

Sling life goes up with "balanced braiding"

Macwhyte's Atlas Braided Slings

There's longer life in an Atlas Braided Sling because of Macwhyte's *balanced* method of construction: 1. Ropes are spliced endless before braiding. 2. Right lay ropes balance left lay ropes. 3. All ropes follow uniform spiral paths, assuring balanced tension throughout the sling body.

Greater flexibility, no kinking, no spinning, and longer sling life are all provided by Macwhyte's "Balanced Braid."



ATLAS DC
Round-Braided
8-part Body
Sling.

Complete line of slings to fit every need

Three types of body are available: Atlas Round-Braided, Drew Flat-Braided, Monarch Single-Part. All are made to order in any size for any job.

Our engineers will gladly study your sling needs and make recommendations.

Two Macwhyte Atlas type 1-CT Round-Braided Slings with 6-ton lifting beam handling plate stock.

MACWHYTE SLINGS

See the hundreds of slings in new Macwhyte Sling Catalog S-8

MACWHYTE COMPANY
Kenosha, Wisconsin

Manufacturers of Internally Lubricated PREformed Wire Rope, Braided Wire Rope Slings, Aircraft Cable, Safe-Lock Assemblies, Monel Metal and Stainless Steel Wire Rope.

Mill depots: New York • Pittsburgh • Chicago • St. Paul Fort Worth • Portland • Seattle • San Francisco • Los Angeles • Distributors throughout U.S.A.

1029-S

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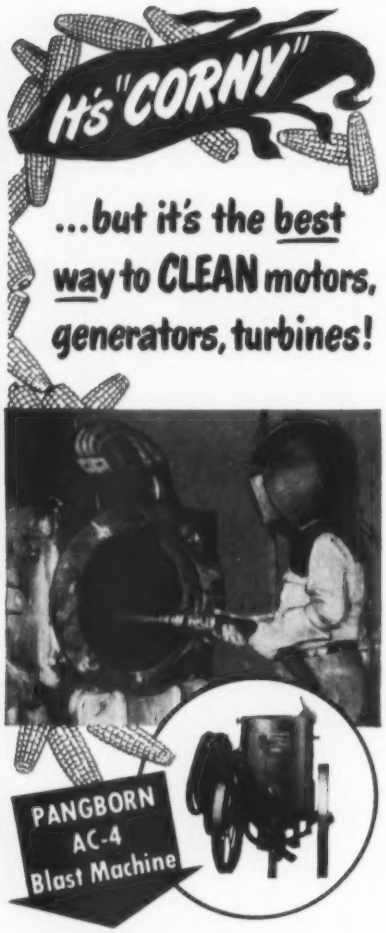

- CUTS DOWN-TIME
- CLEANS WITHOUT SOLVENTS
- ELIMINATES DRYING
- ELIMINATES TOXIC AND EXPLOSIVE DANGERS

THE new Pangborn AC-4 Blast Machine cleans motors, generators and turbines faster . . . cleaner . . . and lets you use them sooner because there's no waiting for parts to dry. In fact, dangerous solvents that can lead to explosions, caustic action, and toxic poisoning are completely eliminated!

The AC-4 uses soft, 20-mesh corncob grits to rapidly remove dirt, grease, old paint, etc., in one-third the time, and at 90% less cost than old-fashioned methods. GET FULL DETAILS . . . write, telling us what you clean, to: PANGBORN CORP., 3200 Pangborn Boulevard, Hagerstown, Md.

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment

Pangborn

BLAST CLEANS CHEAPER with the right equipment for every job

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hoped to acquaint specialists abroad with the wealth of technological data presented in our trade and manufacturing magazines and thus foster the adoption of better production methods.

"We hope you enjoy looking at these digests and would like to take this opportunity of thanking you again for your interest and cooperation." *Gerald L. Sarchet, Chief, Technical Film and Digest Section, Department of Commerce, Washington, D. C.*

Help Wanted!

PLANT ENGINEERING:

"We are in the market for some kind of mechanical device to pick up and stack uniformly hot joint bars, at the rate of one bar approximately every 10 seconds, each bar weighing between 75 and 100 lb. They are delivered to the unloading point in cycles of 14 bars every two and one half minutes with an intermittent time of approximately two to three minutes between delivery of each 14 bar lot.

"Please advise what concern or concerns you would recommend us to contact that might manufacture a machine to do this work." *M. J. Maloney, Superintendent, Poor and Company, Inc.*

Emergency Pipe Repairs

PLANT ENGINEERING:

"I would appreciate it if you could furnish me with the name and address of the manufacturer of the materials mentioned in the article 'Fibrous Glass, Tape and Chemicals Make Emergency Repairs to Pipe' which was described in the August, 1952 issue." *C. T. Zimmerman, Chief Engineer, Borden's.*

Request to Reprint

PLANT ENGINEERING:

"May we have your kind consent to reprint the article 'Less Noise Means More Production' which appeared in your September issue.

"If so, I would indeed appreciate your sending us two extra sets of tear sheets of this article." *Mort Friedlander, Editor, The Foreman's Digest.*

Requests Data on Reorganizing Maintenance Department

PLANT ENGINEERING:

"We are in the process of reorganizing our maintenance department. To accomplish this it would be very helpful to have organization charts of successful maintenance programs in other plants similar to ours. Our plant employs approximately 700 men in fabricating special pipe fittings and other miscellaneous steel products." *K. A. Browning, Chief Plant Engineer, Dresser Mfg. Div.*

Another Query on Fiberfrax

PLANT ENGINEERING:

"We noticed an article in the September, 1952 issue pertaining to a newly developed and versatile fiber recently invented by the Carborundum Co. According to this article, this fiber may be used as a high heat refractory, an efficient filter, and as a chemical resistor.

"We have a fairly large industrial power plant in which from time to time we need to cover steam piping with a temperature of 750 F. Perhaps this material, on account of its superior insulating qualities, might be applied more economically than the materials now regularly available on the market.

"One claim for its superiority is in connection with insulating brick. I judge that you refer to insulating brick made to insulate in furnaces but at the same time so constructed as to have crushing strength comparable to other types of fire brick. I am wondering how its insulating characteristics compare with other products on the market.

"While we do not have in mind a particular application, we would like more complete information as it becomes available." *S. C. Hale, Chief Engineer, Fulton Bag & Cotton Mills.*

BACK TALK

Isotope Article Helpful

PLANT ENGINEERING:

"Thank you for your kindness in forwarding the tear sheets of the article on the use of isotopes which will be very helpful to us." *T. G. Cunane, St. Cuthberts Paper Works, Ltd., Wells, Somerset, England.*

Request from South America

PLANT ENGINEERING:

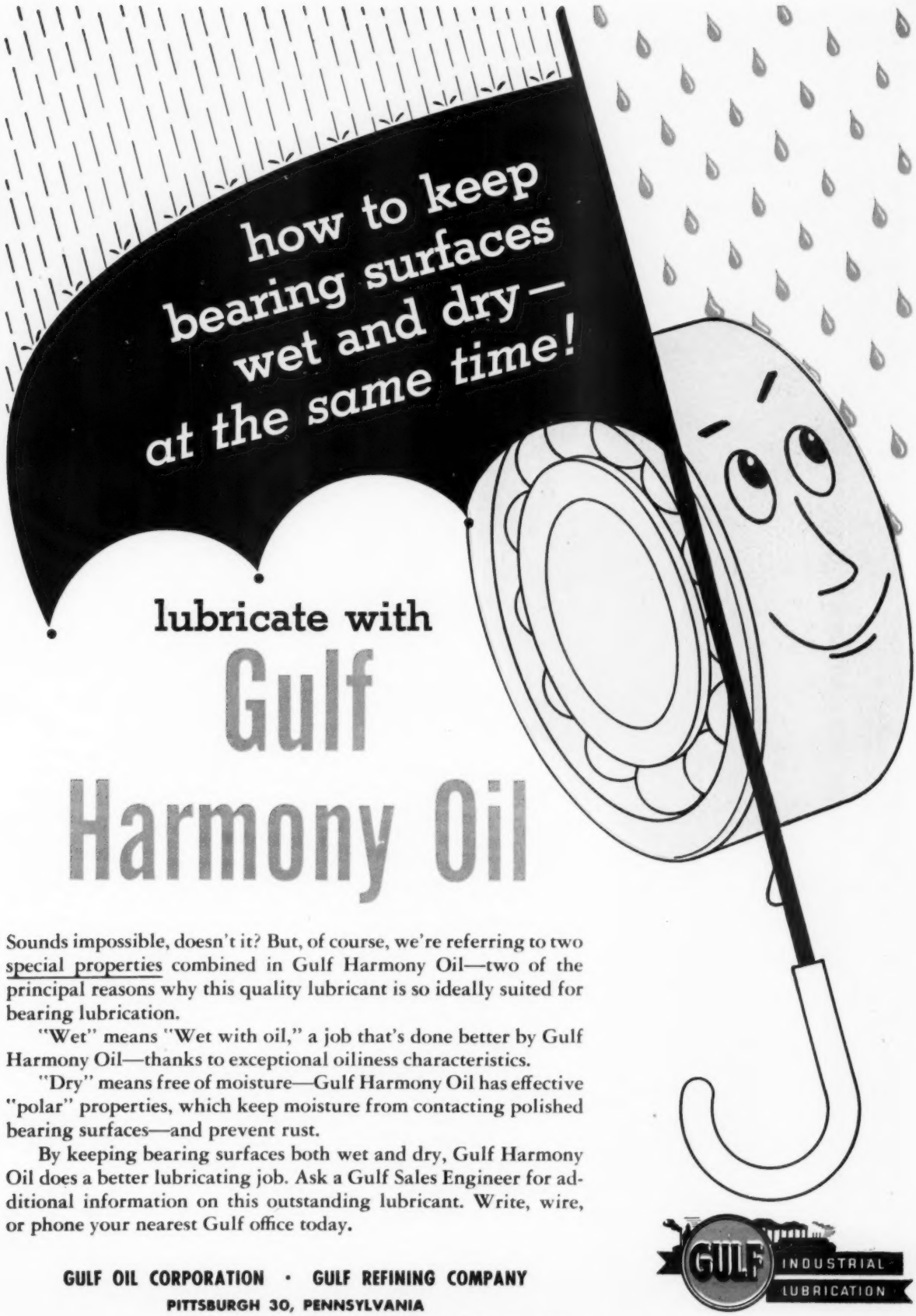
"I would appreciate your mailing me a reprint of your article 'How to Design a Good Work Form' published in the July, 1952 issue. Your publication is very useful in our work." *F. M. Monteagudo, Office Manager, Firestone de la Argentina, South America.*

More on "Slippery" Gas

PLANT ENGINEERING:

"It was with interest that I read Mr. Stempf's reply to my letter on 'slippery' gas in the October, 1952 issue of PLANT ENGINEERING, page 6.

"Relatively simple packing installations are giving very satisfactory performance on compressors for ethylene at 20,000 psi, for hydrogen-nitrogen mixtures at 15,000 psi, for carbon monoxide at 12,000 psi, for carbon dioxide at 6,000 psi, etc. Double seal housings are not used nor are they desirable." *Walter Coopey, Engineering Consultant.*



lubricate with

Gulf Harmony Oil

Sounds impossible, doesn't it? But, of course, we're referring to two special properties combined in Gulf Harmony Oil—two of the principal reasons why this quality lubricant is so ideally suited for bearing lubrication.

"Wet" means "Wet with oil," a job that's done better by Gulf Harmony Oil—thanks to exceptional oiliness characteristics.

"Dry" means free of moisture—Gulf Harmony Oil has effective "polar" properties, which keep moisture from contacting polished bearing surfaces—and prevent rust.

By keeping bearing surfaces both wet and dry, Gulf Harmony Oil does a better lubricating job. Ask a Gulf Sales Engineer for additional information on this outstanding lubricant. Write, wire, or phone your nearest Gulf office today.

GULF OIL CORPORATION · GULF REFINING COMPANY

PITTSBURGH 30, PENNSYLVANIA

GULF INDUSTRIAL LUBRICATION

For more facts circle 519 on Reply Card

for MODERN ... the CONDULET* method gives YOU

A modern installation of Condulets and rigid conduit is always ready for quick change-over to meet the needs of today's fast moving industry . . . without sacrificing the vital qualities of PROTECTION to electrical conductors and SAFETY to personnel, equipment, and the plant.

Only Crouse-Hinds sturdy cast Feraloy Condulets and rigid conduit can give you ALL of these 8 definite advantages:

1. **FLEXIBILITY.** A modern CONDULET installation provides for growth and changing conditions. CONDULETS with detachable hub plates can be used to make it easy to change circuits or add new ones.

2. **MECHANICAL PROTECTION.** Crouse-Hinds sturdy cast Feraloy CONDULETS and rigid conduit provide the best possible protection against accidental damage to the wiring and equipment. Prevents costly shutdowns.

3. **CORROSION RESISTING.** Cast Feraloy CONDULETS give the best protection wherever moisture, dust, or corrosive atmospheres are present.

CONDULETS are made only by CROUSE-HINDS

Actual size photograph of a ¾-inch Obround Conduiet. Sizes ½ to 6-inch A type for every purpose.

CONDULETS · TRAFFIC SIGNALS

WIRING and rigid conduit 8 BIG advantages

Complete Installation of a Conduiet and Rigid Conduit System in a Modern Metal Working Plant

4 SAFETY. Ground continuity is of vital importance. CONDULETS with taper threaded hubs and rigid conduit with tapered threads make a secure joint that provides a reliable and permanent low resistance path to ground. This safety feature assures maximum protection against personal injury and fire.

5 UNIVERSAL APPLICATION. You can install galvanized CONDULETS and galvanized rigid conduit under all atmospheric conditions and in all occupancies.

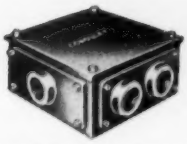
6 ECONOMY. The installed cost of Crouse-Hinds CONDULETS and rigid conduit compares favorably with other wiring methods. The added advantages make it the really economical method that pays dividends over the years.

7 QUALITY. The trademark CONDULET stands for the highest quality, reliability, and long life.

8 VARIETY. More than 15,000 items are listed in the CONDULET Catalog, including a complete explosion-proof and dust-tight line for use in hazardous locations.

FS Series Condulets

GS Series Round Base Condulets



RS Series Junction Condulets Take Detachable Hub Plates

Form 8 Series Condulets Have Large Bodies

Arktite Plug Receptacles

V Series Vaportight Lighting Fixtures

On YOUR next electrical layout, plan to get all the benefits of sturdy cast Feraloy CONDULETS and rigid conduit . . . the universal wiring method.

CROUSE-HINDS COMPANY
Syracuse 1, N. Y.

OFFICES: Albuquerque—Birmingham—Boston—Buffalo—Chicago—Cincinnati—Cleveland Dallas—Denver—Detroit—Houston—Indianapolis—Kansas City—Los Angeles—Milwaukee Minneapolis—New York—Philadelphia—Pittsburgh—Portland, Ore.—San Francisco Seattle—St. Louis—Washington. RESIDENT REPRESENTATIVES: Albany Atlanta—Baltimore—Charlotte—New Orleans—Richmond, Va. Crouse-Hinds Company of Canada, Ltd., Toronto, Ont.

A Nationwide Distribution Through Electrical Wholesalers

AIRPORT LIGHTING • FLOODLIGHTS

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NO, SIR! The Seal Won't Blow!

METALLIC-BACKED neoprene seals are used in this famous bearing—and they are engineered to *stay put.* They won't blow.

Your lubricant stays in; dust and dirt stay out; the result is years of trouble-free performance.

The "SC" Bearing is a service-proved member of the Dodge 30,000 hour line. Modern styling. Rugged one-piece cast-iron housing. Long inner race. Radial and thrust load capacity. Fully self aligning. *WRITE* for complete information on the "SC" Bearing in the Dodge catalog.

DODGE MANUFACTURING COPPORATION, 2700 Union St., Mishawaka, Ind.

DODGE TYPE "SC" BALL BEARING PILLOW BLOCK

Precision built bearing for small shafts and moderate loads. Pillow blocks, flange bearings and hanger bearings available from distributors' stocks in shaft sizes ranging from 3/4" to 2-7/16".

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained, he can give you valuable assistance on new, cost saving methods. Look for his name under "Power Transmission Equipment" in your classified telephone book.

DODGE

of Mishawaka, Ind.

FIRST IN POWER TRANSMISSION MACHINERY

FOR YOUR NAME PLATE REQUIREMENTS, WRITE OUR SUBSIDIARY, CHICAGO THRIFT-ETCHING CORPORATION, 1555 SHEFFIELD AVENUE, CHICAGO 22, ILLINOIS

For more facts circle 521 on Reply Card

HALL INDUSTRIAL WATER REPORT

Hall Laboratories, Inc.—A Subsidiary of Hagan Corporation, Pittsburgh, Pa.

Volume 1 | FEBRUARY 1953 | Number 1

New Water Manual Published by ASTM

Of interest to everyone concerned with industrial water is ASTM's "Manual of Industrial Water," a January 1953 release, prepared by Committee D-19. Manual discusses uses of industrial water, difficulties caused by industrial water, compositions of waters and deposits, treatment, sampling, analysis of water, identification of water-formed deposits.

Research by Hatch Gives New Basic Facts on Threshold Treatment for Corrosion Control

Research papers by Dr. G. B. Hatch of Calgon, Inc., titled "Protective Film Formation with Phosphate Glasses" and "Inhibition of Galvanic Attack of Steel with Phosphate Glasses" provide a better scientific understanding of the mechanism of film formation with Calgon.

Data prove Calgon stops corrosion by virtually eliminating flow of current between anode and cathode in corrosion cells.

Research shows Calgon is a cathodic inhibitor. All cathodic inhibitors are "safe" inhibitors, because they do not increase tendency toward pitting.

Data reveal that protective film is formed by electrodeposition process, and that Threshold Treatment for corrosion is quite different from Threshold Treatment for scale prevention.

Write if you want a free copy of these fundamental papers.

Industrial Water Statistics

According to U. S. Dept. of Commerce statistics, use of industrial water for process has been estimated at 80 billion gal per day during 1950. This is 8 times the quantity required in 1900, although population increase in same 50 years was only 2-fold.

Manufacture of steel, production of electric power require 50 billion gallons of the 80 billion per day. Industrial use of water is estimated to increase 170 per cent from 1950 to 1975, according to Materials Policy Commission.

Pilot Plant Designed for Steel Company Results in Minimum Cost for Waste Disposal

A Pennsylvania steel company had to dispose of wash waters evolved in the manufacture of producer gas.

This wash water contained objectionable quantities of phenol, sulfide, and cyanide.

Preliminary study showed that either chemical treatment, or closing up wash water system could do the job. A Hall Labs staff engineer recommended use of a pilot plant to determine chemical treatment costs. He specified equipment for pilot unit, and provided detailed instructions for operation. Pilot plant showed that all hydrogen sulfide and cyanide and about 90% of phenol could be removed.

But cost analysis of chemical treatment revealed it was 2 or 3 times as costly as closing up system. On this basis, decision was to install a recirculating system for the producer gas wash water.

Major problem in closed system was build-up of suspended solids. Methods of controlling this were studied by the Hall staff, and recommendations made to steel company.

State antipollution requirements were satisfied, and another step taken toward clean natural streams with the minimum cost to industry.

Field Reports on Industrial Water Treatment

Herman Reda, Service Engineer in our Detroit Office, made the following report on a food processing plant in his area:

"Turbines have now operated continuously for 3½ years. Prior to use of Hall System, plant had to clean units every 6 months."

A report on boiler water control comes from Bill Pfeiffer of the St. Louis Office. Report concerns a paper company:

"Client is pleased with silica treatment. After silica had been fed for about 3 months, boilers were opened for inspection, found to be much cleaner than client ever saw before. Heavy sludge usually found in top rear drum and mud drum was almost gone. Silica is also helping out at the filters, and filtered water contains no suspended matter. Client cleaned filters with Buromin—pleased with results."

"Calgon" and "Buromin" are names of phosphate glasses developed by Hall Laboratories for industrial water treatment and marketed, respectively, by its associates, Calgon, Inc., and the Buromin Company who have registered the names in the U.S. Patent Office as trademarks. "Hall System" is similarly registered as a service mark by Hall Laboratories.

Industrial Water Problems Require Special Handling

There are no "stock answers" to industrial water problems. For information, write, wire or call Hall Laboratories, Inc., P.O. Box 1346, Pittsburgh 30, Pennsylvania.

Water is your industry's most important raw material. Don't waste it.

PLANT ENGINEERS' DIGEST so those who rush may read and know what's new

Edited by E. B. Skubik

Pedestal and Derrick Separately Guyed

IN THE CONSTRUCTION of refineries and chemical plants, the proper handling of material and equipment is an important factor in keeping costs of the work at a minimum and speeding completion of the construction.

To accomplish this objective, the use of specialized tools has been developed to a high degree. One of these is a guyed derrick pedestal which has been used in construction work at Esso's refinery in Everett, Mass.

The guyed pedestal, consisting of two sections, has a height of 50 ft. It is so constructed that it may be taken apart at the center. If more height is desired, two additional 25 ft sections may be added, increasing its height to 100 ft.

The derrick, consisting of the usual mast and boom, is placed on top of the pedestal. The derrick and pedestal are pivoted so that they can operate as individually guyed members.

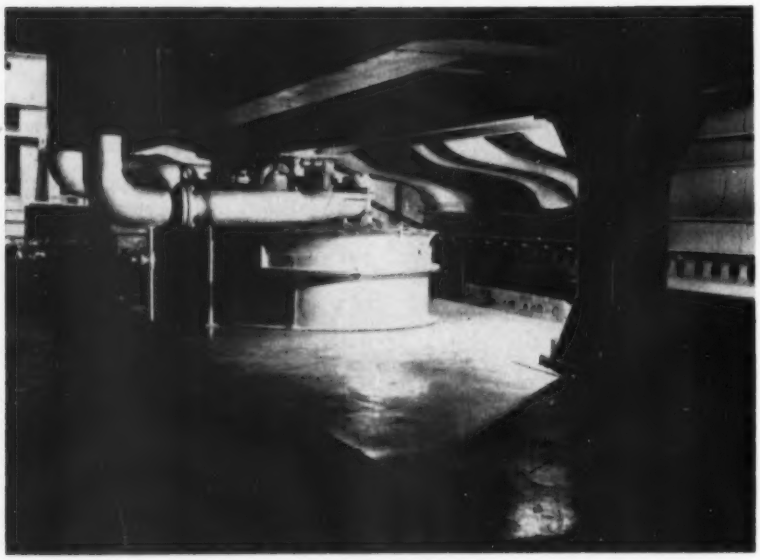
Movement of the two members under heavy loads is thus controlled by guy lines, and stresses on the pedestal are greatly reduced. No reflected bending is present in the pedestal due to the derrick load.

View presents relative position of derrick mast and pedestal. In working order, boom and platform are secured at approximate level where men stand

Being only 4 ft sq (as against 10 or 12 ft for the average guyed tower) this type of derrick pedestal requires less working space on the job site. Also, it is so designed that the derrick may be raised from a temporary ground position to the top of the tower in approximately 4 hours.

Among the design advantages cited for a guyed pedestal over a guyed tower are: reduced weight, ease of erection, dismantling and transportation, and safety in operation. *From Heat Engineering, published by Foster Wheeler Corporation, New York 6, N. Y.*

Axial Flow Forced Draft Blower Solves Space Shortage Problem



Production expansion at the New Brunswick plant of E. R. Squibb & Sons, pharmaceutical manufacturers, called for a new steam generating unit. Due to the lack of space an area underneath the overhang of the new boiler came in handy for the location of the forced draft blower. Although it supplies 47,700 cfm of air at 5 in. static pressure, the blower occupies only a 54 in. dia space and is 33 in. high. (From a release of L. J. Wing Mfg. Co., Linden, N. J.)

Glass Wear in Boiler Gages

REPORTS outlining difficulties being experienced with both round and flat types of gage glasses are occasionally received by our service department and laboratories. The problem that is most frequently cited is one of erosion or attack on the gage glass itself, resulting in cloudiness in the glass and occasional leakage.

Severe wear normally takes place at the bottom of round glasses. This is usually attributed to erosion due to high velocities when the gage glass is blown.

It is true that some softening attack on the glass at this point may take place due to intermittent contact with alkaline boiler water. But most manufacturers agree that high velocity is the cause for actual glass losses.

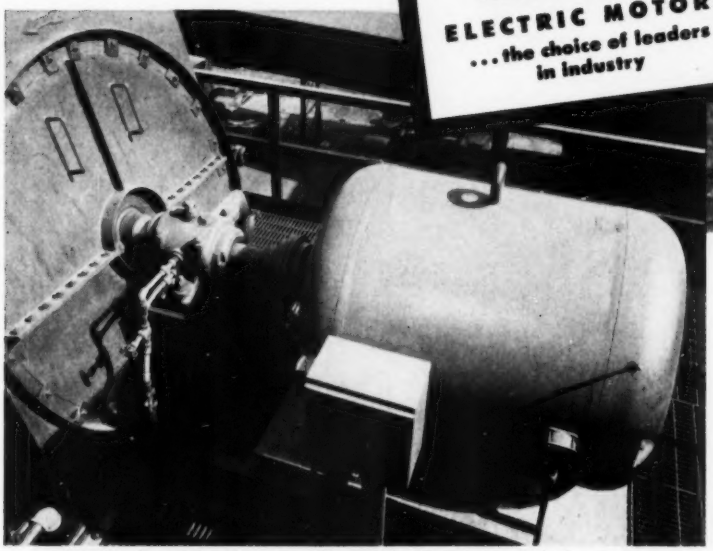
Flat type gage glasses normally have grooves and ridges on the water side to produce a definite optical effect at the water level. When new, the ridges are smooth and round. Gage glasses were received by us where the ridges had almost completely disappeared below the water line, while still remaining smooth.

Other gage glasses received showed severe attack on the glass above the water line, namely in the steam condensing section. The attack above the water line left ragged, sharp edges. This is the more common type of attack.

Manufacturers of Pyrex glass and also of the gage columns could offer no information as to the cause of these conditions. The theories mentioned so far have been gradual solution of the glass below the water line by alkaline boiler water. Above the water line, it was claimed that some gas or chemical re-dissolving in the condensed steam causes the attack. The actual gases were not mentioned.

Specific recommendations by gage column manufacturers to prevent this attack on flat gage glasses include the insertion of a mica shield between the gage glass and the water. The mica shield will protect the glass and not interfere with the

This 250 hp, 220 volt motor starts with minimum line voltage disturbance . . .



Wagner
ELECTRIC MOTORS
. . . the choice of leaders in industry

This fly ash control equipment, on the roof of a Detroit Auto Body Corporation, is powered by a 250 hp, 220 volt, 1160 rpm, totally-enclosed Wagner motor.

because it's a

Wagner

Increment Motor and Starter Combination

The part-winding increment motor and starter combination (pioneered by Wagner) provides an economical method of starting polyphase squirrel-cage motors for any application where reduced current draw at start is required or desirable. No auto-transformers or resistors are necessary.

Voltage disturbances on the line are reduced because current taken from the line is not broken during the starting period—as is the case when auto-transformers or compensator-type starters are used.

You benefit when you install a Wagner increment motor and starter "package" because you get a highly efficient, most economical, motor and starter combination that limits inrush of motor current to values that are acceptable to most power companies for all or parts of their distribution systems.

* * *

When you standardize on Wagner Motors—you get the advantages of a liberal warranty . . . of nationwide service facilities, with on-the-spot service, replacement motors and parts available from 25 Wagner-owned Service Branches and more than 750 Authorized Service Stations. You can choose from a wide variety of types and sizes (from 1/125 to 400 hp.) Bulletin MU-185 gives complete information—write for your copy. Bulletin MU-128 gives full information on Wagner Increment Motor and Starter Combinations.

WAGNER ELECTRIC CORPORATION
6492 Plymouth Ave., St. Louis 14, Mo., U.S.A.

® Wagner Electric Corporation EST. WE 1891

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS – AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES

M53-6

For more facts circle 523 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 30)

optical characteristics of the glass.

Replacement of the mica shield is necessary at very infrequent intervals and is dependent on the number of times the mica is cooled and heated again.

Reports indicate a new mica shield will be required after removing the boiler from the line and placing it back in service approximately each 15 times.

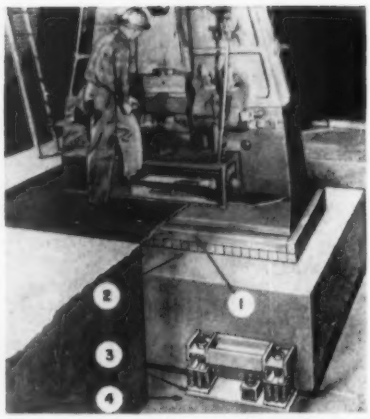
Where continuous difficulty is experienced with the round gage glasses, the manufacturer suggests changing to the flat type with the mica shield. *From The Betz Indicator, published by W. H. and L. D. Betz, Philadelphia 24, Pa.*

Forge Hammer Shock Test

FORGING HAMMERS are designed to deliver tremendous impacts to the metal being formed. The jarring blows can sometimes be felt over a mile from the hammers.

Shocks from hammers can do damage to buildings and other equipment. The blows can pound the hammer foundation down into the ground so that frequent relevelling is necessary.

Tests conducted at the Steel Improvement and Forge Co. of Cleveland, Ohio prove that this shock can be completely controlled. A Carometer was used to obtain readings



Please see text for number reference

during these tests. This instrument is designed to give readings of the maximum force in terms of the acceleration of gravity (g). The hammer base could not be used for readings because the extremely high accelerations at this point exceeded the maximum capacity of the accelerometer.

Numbers on the figure indicate the location of the test points. A reading of 7 g's of vertical force was obtained at point No. 1, on timber immediately under the anvil. At point No. 2, on top of the concrete inertia mass supporting the hammer, the instrument showed 4 g's. The isolator base plate location presented a reading of 0.07 g. The Carometer indicated 0.062 g at point No. 4, on the bottom of the pit adjacent to isolator base plate.

Comparative tests on non-isolated and spring isolated hammers conducted previously at this modern, progressive forge shop demonstrated that the blow efficiency of a spring isolated hammer is increased slightly over that of a non-isolated hammer. *From a release of The Korfund Co., Inc., Long Island City, New York.*

Warning Notice Puts Emphasis on Safety Program

SAFETY WARNING NOTICE

Employee _____ Clock No. _____

Department _____ Date _____

You have been observed committing the following Safety Violation. Any repetition of this or other safety violations may result in suspension or discharge.

_____

_____

_____

_____ _____

Signature of Employee — Signature of Foreman or Supervisor

cc: Employee
Foreman
Union
Personnel Dept.

_____

Approval of Foreman

F52 **SAFETY IS EVERYBODY'S BUSINESS!**

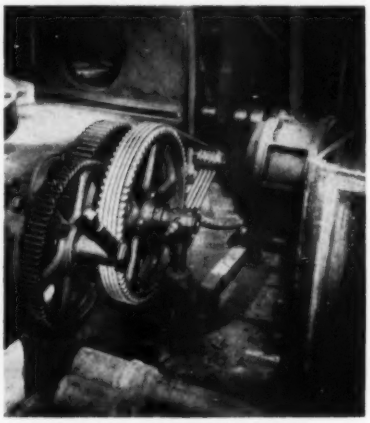
This safety warning card is issued to each employee observed violating a safety regulation. Record of safety violations evaluates safety liability of each employee. (From The Coleman Spot-Lite, published by Coleman Co., Wichita, Kan.)

V-Belts Use Gear for Sheave

IN THE MANUFACTURE of cast iron freight car wheels, a cast iron ring called a "chill" forms the outer part of the mold and produces the hard surface and contour of the tread and flange of the wheel.

A vertical boring mill is used to machine these cast iron "chills" at the Marshall Car Wheel and Foundry Co. plant in Marshall, Texas.

The mill was originally driven through a train of open gears. But backlash in the gears produced chatter marks which were visible on the "chills." Because the treads of car wheels must be smooth and



Boring mill in Texas plant is successfully driven by V-belts riding over gear

free from roughness, it was necessary to find some way to eliminate the chatter marks.

The shop superintendent decided to try a V-belt drive on the mill. The pinion on the motor shaft was removed and a small grooved pulley was installed. At first, he intended to use the driven gear as a flat pulley by welding a steel band around its face.

Since the changeover had to be made quickly, he had to change his plans. The grease was cleaned off the gear, sharp burrs filed, and a set of V-belts was installed directly on the gear teeth.

It is reported that this drive gets smooth performance out of the mill and brings about a reduction of processing time on the "chills." *From Gates Industrial News, published by The Gates Rubber Co., Denver, Colorado.*

LP Twins—Butane and Propane

LP GAS is the all inclusive term for liquified petroleum gases. Butane and Propane or any mixtures

Solves leakage problem . . .

● Multi-clean Products, Inc., St. Paul, Minnesota, manufactures industrial floor polishing and scrubbing machines. The machines are shipped with grease already installed in gear reduction units. The problem faced by this company was one of finding a grease that would stand up under hard service and not leak from the gear units. Greases tried either caused or threatened leakage troubles.

Called in on this problem, a Standard Oil lubrication specialist recommended STANOBAR Grease "S", a highly stable grease with a unique adhesive characteristic. Given an accelerated service test, STANOBAR did not leak from the gear unit, and its consistency showed no change that would later cause a leakage problem. There was no wear of gears or bearings. Adopted for use in the units, STANOBAR has solved this company's lubrication problem on every count. Officials have been able to eliminate the costly and troublesome practice of having all units returned to the factory, at 12 months intervals, to be repacked with grease.

STANOBAR
TRADE MARK
Grease

The same lubricating qualities of STANOBAR that solved this problem for Multi-clean Products, Inc. can serve you in a wide variety of applications. A Standard Oil lubrication specialist will be glad to discuss those applications with you. He's right there in your section of the Midwest. You need only phone your local Standard Oil office. Or write, Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

What's YOUR problem?

C. L. Daub is the Standard Oil lubrication specialist who helped Multi-clean Products, Inc. solve an important lubrication problem through his recommendation of STANOBAR Grease.

Like all Standard Oil lubrication specialists, he has a broad background of practical experience plus thorough training in Standard's own schools. And like all lubrication specialists, his on-the-job assistance is always available to the industries in the immediate area he serves. He is one of a corps of experienced men who make their headquarters wherever industry is located throughout the Midwest. Call for the services of your Standard Oil lubrication specialist today. When he stops at your plant, be sure to get information on these outstanding products:

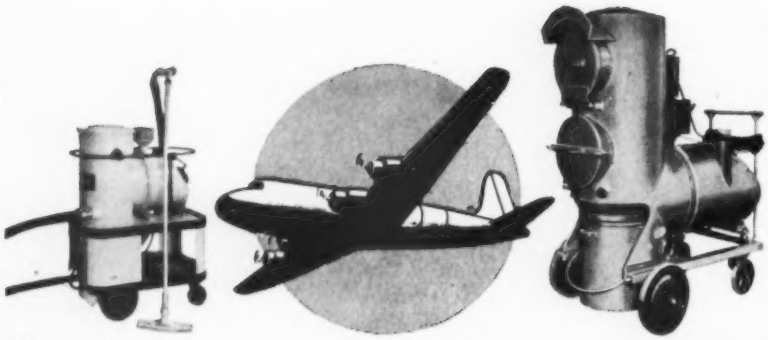
STANOIL Industrial Oils—This multi-purpose line of oils provides cleaner operation of hydraulic units, supplies effective lubrication in compressors, gear cases, and circulating systems. One of two grades can replace a wide variety of special oils and lubricants.

CALUMET Viscous Lubricants—On open gears and wire rope, these greases resist washing and throw-off. Their superior wetting ability affords better coating of gears and better internal lubrication of wire rope.

STANORUST Rust Preventives—The eight grades of STANORUST form one of the most complete and effective lines of rust preventives on the market today. Each has been scientifically and specially developed for its intended use. The grades range from a fingerprint remover to a heavy semi-solid that protects against corrosion for years under the most severe outdoor exposure.

STANDARD OIL COMPANY

STANDARD *(Indiana)*



1½ H. P.

7½ H. P.

A daytime production tool with 100 uses. At night, Spencer machines like these clean thousands of acres of industrial floor space.

AIR EXPRESS

RIGHT IN YOUR PLANT

Industry has taken to the air to speed up the movement of raw materials and the tedious work of cleaning, inspection and packing of finished goods. It's the air of powerful vacuum—Spencer Vacuum which is being used daily for more than 100 startling applications for conveying, recovery, waste disposal, automatic dust-free production and sanitation, particularly in the food, chemical and metal industries.

It is moving mountains of rice from freight cars, hot fly ash from pits and sand from the bowels of ships. It is carrying tons of chemicals to the top of a plant for screening, and sorting operations by gravity with a final vacuum pickup from trays on the ground floor. It is picking metal chips out of machined products by the ton and recovering such valuable materials as babbitt, solder, gold, enamel dusts, mercury and solder flux.

For the more delicate manufacturing processes, Spencer Vacuum is speeding bench work, reducing dust conditions and cleaning the finished products. In food it's sanitation, vermin control and conveying.

Any kind of loose material can go "by air" the Spencer way. From heavy metals to loose powders and liquids of all kinds—it makes no difference to Spencer. But it makes a lot of difference to the men who formerly had to do these jobs by hand. More than 100 essential applications are included in Spencer Bulletin No. 144.

427-F

THE SPENCER TURBINE COMPANY • HARTFORD 6, CONNECTICUT

SPENCER
HARTFORD

For more facts circle 525 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 30)

of the two fall in this category. Both of these are in a gaseous state under normal temperature and pressure conditions. However, they are easily liquified under moderate pressures and are stored and handled more easily as liquids.

When used as fuels in internal combustion engines, a mixture of the two gases is often used. This is due to the differences in boil-temperatures, or the temperatures at which each changes from a liquid to a gas. At normal pressure, the boiling point of Butane is 31 F, while for Propane it is —40 F.

During cold weather operations, the fuel mixture is primarily Propane, because it is desirable to have the fuel as a gas when used as engine fuel. In warm weather operations, however, the mixture is mainly Butane, due to the lower operating pressures needed to control the fuel. Availability of either Propane or Butane will quite often determine the mixtures. *From an article by Mark H. Coons, in LeTourneau Co-Operator, published by R. G. LeTourneau, Inc., Peoria, Ill.*

Transparent Plastic Pipe

TRANSPARENT plastic pipe and fittings of cellulose acetate butyrate in sizes ranging from ½ in. through 4 in. are now available for laboratory and pilot plant use.

The pipe offers many advantages for handling oils, gasses, water, slurries and a wide variety of chemicals because it permits observation of processes, and has extremely high resistance to corrosion and other forms of chemical attack.

Clear pipe such as is utilized in this hook-up requires no pipe threading tools

Sections of the pipe are quickly and easily joined by a solvent cement that produces a leak-proof, homogeneous bond. No threading or special tools are required, even

(Continued on page 40)

Cut Your V-Belt Costs Right Now!

—this test tells how!

If you want longer V-Belt wear and lower V-Belt costs just make this simple test. Bend any V-Belt that has *straight sides* and—as it bends—*feel* the sides bulge out! (See Fig. 1-A, below)

This out-bulge forces the belt to press unevenly against the V-pulley and of course wear on the belt is concentrated where it bulges most. Naturally this shortens the life of a *straight-sided* V-Belt.

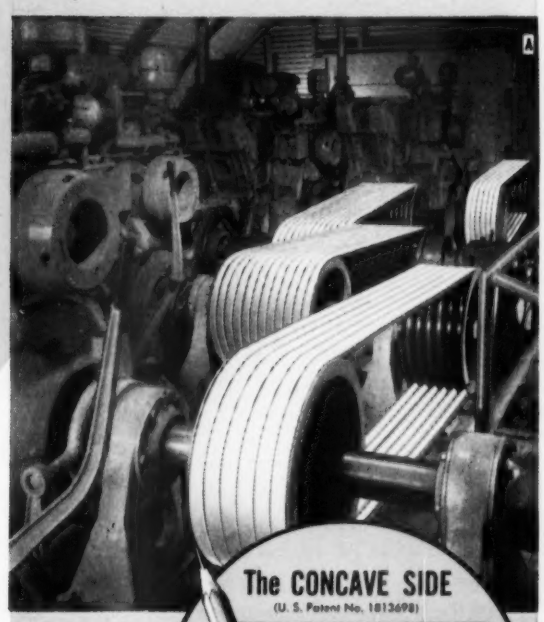
Now, make this same test with the belt that is built with *concave sides*—the Gates Vulco Rope!

See the difference? There is no *out-bulge!* The precisely engineered concave sides *fill out* and become *perfectly straight.* They now *exactly fit* the sheave groove and therefore *press evenly* against the V-pulley. This distributes all wear *uniformly* across the *full width* of the Gates Vulco Rope. And this means longer belt life and *lower belt costs* for you.

Only V-Belts made by Gates are built with concave sides. Whenever you buy V-Belts, be sure that you get the V-Belt with Concave Sides—the Gates Vulco Rope!

Gates Engineering Offices and Jobber Stocks are located in all industrial centers of the United States and in 71 foreign countries.

Multiple engines and generators were installed to supply power during the development of Chicago, Wilmington and Franklin Coal Company's Waltonville, Illinois, Coal Mine. The engines had to be connected to the generators with a drive that would absorb vibration and also be completely reliable—so these Gates V-Belts were installed. Mr. Rodenbush, Superintendent, says, "The Gates Vulco Rope Drives have been entirely satisfactory in every way."

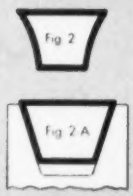


What Happens When a V-Belt Bends

Straight-Sided V-Belt

How a Straight-Sided V-Belt Bulges in the Sheave-Groove. Sides Press Unevenly Against the V-Pulley, Causing Extra Wear at Point Shown by the Arrows.

Gates Vulco Rope With Concave Sides



The Concave Sides Fill Out to Precise Fit in Sheave-Groove. No Side-bulge! Sides Press Evenly Against the V-Pulley —Uniform Wear and Longer Life!

CS-531

Gates® VULCO ROPE DRIVES

THE GATES RUBBER COMPANY • DENVER, U.S.A.

V-Belts — Hose Molded Rubber Goods for industry World's Largest Maker of V-Belts

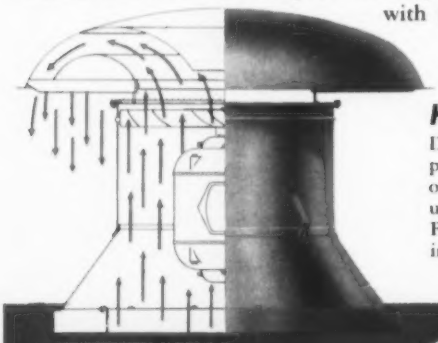
For more facts circle 526 on Reply Card

(Photo courtesy of National Biscuit Company)

Smart Cookies (LIKE NABISCO) CALL FOR Controlled Ventilation

At Portland, Oregon, the modern National Biscuit Company plant is one of the most scientifically equipped food producing establishments in the world. But you can imagine how hot it could get around ovens that turn out several million cookies a day! Plant designers Ford, Bacon and Davis anticipated the need for exhausting hot air caused by baking processes, and came up with the right recipe. 42 DeBothezat Power-Flow Roof Ventilators, each with 21″ fan wheel and 1 HP totally enclosed air-over motor, were installed over the oven area. 19 Power-Flows with 27″ fan wheel and 1 HP motor were installed above the packaging and shipping areas. Altogether these 61 Power-Flow Roof Ventilators exhaust more than 445,000 cubic feet of air per minute. Controlled ventilation assures good working conditions, and is in keeping with the high standards of NABISCO operation and sanitation.

Certified Ratings



HOW ABOUT YOUR PLANT?

DeBothezat Power-Flow Roof Ventilator is a motor-driven fan in a weatherproof housing, for use with or without duct systems, either for air exhaust or intake. Available with fan wheels 12″ through 48″ in diameter, delivering up to 40,900 CFM. Low, streamlined design blends well with all architecture. For catalog containing illustrations, specifications and certified capacity ratings, write our factory, Dept. PE-253, or phone your local DeBothezat agent.

Power-Flow ROOF VENTILATORS

built by

DeBothezat Fans

Division of American Machine and Metals, Inc.
EAST MOLINE, ILLINOIS

For more facts circle 527 on Reply Card

BULLETINS just released and of immediate plant interest

CONSTRUCTION

101 For Interiors as Needed—Catalog 53, 48 pp, shows how space layouts can be made permanently efficient with movable walls. Their enamel finishes, welded steel construction, soundproofing and insulation and other features are covered. Other sections of book are devoted to types of walls—flush pilaster, executive, semi-flush and commercial. Doors, ceilings, transoms, louvers, grilles, shelving, other accessories are described. Mills Co.

102 ABC's of Rolled Glass—Explaining the functions of rolled glass, this 20-pp booklet presents types designed for diffusion, for decoration, for protection, and combinations of these functions, as well as for heat absorption and glare reduction. Profusely illustrated with photos of installations and glass patterns, booklet gives light transmission qualities of each type, sizes, weights. Mississippi Glass Co.

103 Roof Insulation—This interesting new folder on Fiberglas roof insulation opens up to a 33 by 25 in. sheet containing more than 40 photos of outstanding installations throughout the country. Also lists 350 more installations along with names of architects, contractors. Thermal conductance data and specifications included. Owens-Corning Fiberglas Corp.

104 Need a Building?—This 24-pp brochure describes the economy, versatility and easy erection of company's Stealine buildings. Detailed drawings, charts, photos, and text explain design, construction and function of clear-span, rigid-frame, factory produced buildings available in 32- to 70-ft widths, and lengths in multiples of 20 ft. Soulé Steel Co.

105 Standardized Buildings—This 20-pp illustrated booklet shows how company's line of structures offers cost- and time-saving advantages of standardization, yet permits freedom of building design and architectural treatment. Photos show adaptability to many building requirements, and there are drawings of clear span and center column industrial structures. Luria Engineering Corp.

MAINTENANCE

106 Tips on Floor Care—The newly revised version of "101 Hints on Better Floor Care" is a 28-pp pocket-size booklet chockfull of tips on floor maintenance. Covers 64 major floor problems involving the treatment of asphalt, cork, ceramic tile, rubber, concrete and wood. Tells how to maintain a waxed surface, wash a mop, avoid hard water troubles, choose the right soap, when and how to seal a floor, etc. Huntington Laboratories, Inc.

108 Proper Care of Floors—Filled with what-to-use and how-to-use-it information, this 32-pp booklet is a well-written, practical text on floors. Presents floor preservation as a triple process involving cleaning, sealing and maintaining. Discusses various floor surfaces and their special problems. Gives helpful hints on floor maintenance and provides a handy chart covering preservation procedures and products for 12 common floor surfaces including cement, cork, tile, linoleum, mastic wood. West Disinfecting Co.

109 For the Overhead Jobs—Scaffolds designed to make overhead work safer and easier are described in 16-pp Form 10-852. Illustrates and discusses adjustability, large working platform, easy assembly, self-locking trusses and other advantages. Shows how they are readily stacked for height. Baker-Hood, Inc.

110 To Reach the High Spots—Bulletin 1250 describes and pictures company's Model PUL, a high-reach platform telescoper designed to provide safety to both worker and equipment for overhead painting, installation and maintenance jobs. Tells how it's built for one-man operation. Gives specifications, prices of three styles available. Economy Engineering Co.

PAINTS AND COATINGS

111 Industrial Rust Preventatives—Showing how manufacturer's products stop rust throughout industry, this 16-pp general catalog provides 73 color chips and includes directions for surface preparation and application. Covers primers, short- and long-oil types, machinery and implement finishes, chemical and heat resistant types, sealers, thinners, coatings. Rust-Oleum Corp.

112 Coating Fact Book—This little 12-pp booklet describes a corrosion-resisting coating for industrial use. Tells what the coating protects metal surfaces against, and where to use it. Stresses minimum surface preparation. The Nitrose Co., Inc.

114 The Function of Color—This bulletin presents company's Optonic system of color selection, according to which basic colors are selected to complement and soften predominant color of working light. The system is built around company's oil- and latex-base interior wall and trim paints. Color chips show colors in degrees of intensity and light reflectance. Includes specifications. The Arco Co.

115 Right Over Rust—A rust inhibiting paint which may be applied over the rusted metal is described in this literature. Explains outstanding features of the paint—resistance to exposure, increased protection against corrosion, resistance to chemicals, etc. Tells where and how to use it; shows colors. L. Sonneborn Sons, Inc.

MATERIALS HANDLING

116 Traveling Cranes—Catalog 221, 28 pp, introduces a new series of company's Load Lifters. These double-girder overhead electric cranes are mass produced and designed to offer, for average industrial service, cranes of 1 to 20 lb capacity at prices below usual for cranes of like capacities. Fully illustrated, booklet explains construction advantages, trolley styles available. Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc.

117 Belt Conveyors—Virtually a handbook on belt conveyors, 90-pp Catalog 852 presents information on the latest designs of conveyor details and engineering data necessary to plan a belt conveyor for any application. In addition to specifications on company's standard belt conveyor units, gives data on anti-friction idlers and other

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equipment necessary in the application of belt conveyors—belting, trippers, pulleys, take-ups, backstops. The Jeffrey Mfg. Co.

118 **Gravity Conveyors**—Stating that the "lowest cost between two points is a gravity conveyor" this 16-pp bulletin describes standard light duty roller conveyors, staggered wheel conveyors and side wheel conveyors. In addition to suggested application data, provides photos and blueprints, of each type, and gives engineering specifications, sizes. Packing Equipment Div., Food Machinery and Chemical Corp.

119 **Engineered Monorail Applications**—A file of application literature is announced as the beginning of a new service offered potential users of monorail equipment. Includes a technical booklet on automatic dispatch systems and an equipment bulletin in addition to several case studies of installations. As they are completed new groups of case studies will be sent to holders of this file. Available to qualified plant engineers, please state title when requesting it. The American MonoRail Co.

120 **Elevators and Controls**—"Vertical Transportation," this company's 1963 general catalog describes passenger and hospital elevators, escalators, dumbwaiters, and freight elevators, also elevator modernization and maintenance programs. Photos and drawings illustrate the text, and 17 tables give dimensions. Otis Elevator Co.

121 **Truck Attachments**—How to increase efficiency of powered industrial trucks is the theme of Form B-320. Shows how specially designed attachments enable one truck to do the work of many. More than 25 attachments are pictured and described. The Elwell-Parker Electric Co.

122 **How Pallet Boxes Cut Costs**—This 12-pp brochure shows how use of pallet boxes results in more economical handling, storage and shipment of materials and finished products. Pictures and describes their use. General Box Co.

123 **For Unit Load Handling**—Bulletin P-1172-A describes company's Pak-Loader system for handling materials in unit loads without pallets. Shows how, by using a special steel plate and fork truck equipped with a pusher attachment, this system provides advantages of palletized handling. The Yale & Towne Mfg. Co.

124 **Versatile Winch Hoists**—Some of the many uses for lightweight hoists of 750- to 3000-lb capacities are described in Bulletin 116. Discusses safety features, construction, easy maintenance. The Lug-All Co.

VENTILATION AND DUST CONTROL

125 **Roof Ventilators, Louvers**—How available to qualified plant engineers is a collection of literature on gravity and powered roof ventilators and ventilating louvers. Includes a résumé of engineering helps for working out a ventilation problem—a guide for estimating ventilating requirements, installation procedures, sizes and capacities. The Swartwout Co.

126 **Dust Collection Equipment**—A paper on "Operation, Application and Effectiveness of Dust Collection Equipment, originally presented as part of an industrial ventilation course, is available. Contains charts on costs of dust collecting equipment; range of particle sizes, concentrations and collector performances; drawings of types of dust collectors; list of practical "don'ts," and other data on selection, installation and operation of equipment. Amerios Air Filter Co., Inc.

127 **Automatic Continuous Filtering**—The high dust collecting efficiency of company's AC filters is stressed in 16-pp Bulletin 526. Explains and pictures principle of cleaning filter cloth with high pressure reverse air jet, as utilized in the filters, and gives performance test data. Eight installations specially engineered to fit unusual dust control applications are illustrated. Also includes capacity ratings, dimensions. The Day Co.

128 **Dust Collecting from Grinding Wheels**—How the dust from 27 grinding wheels in the tool room of a compressor manufacturing plant is being controlled by a standard DustKop dust collector is described in Bulletin 637. Aget-Detroit Co.

INSTRUMENTS, CONTROLS

129 **Control Equipment**—Catalog 60B, 32 pp, presents company's equipment for the control of liquids and gases for water and sewage works, power and process industries. A well illustrated booklet, it lists many types of controllers, gages, manometers, valves, venturi tubes. Descriptions of the units, operating characteristics, construction details, mountings, specifications included. Simplex Valve & Meter Co.

130 **Proper Measurement Transducers**—Bulletin 15-16, 12 pp, contains technical data on the application of power measurement transducers to process control. Some typical applications are presented, and measurements and control of a-c power plus the measurement and control of d-c powered are covered. Engineering descriptions of applications of thermal converters, solenoid-plunger ammeter, torquemeter, vacuum thermocouple, rectifying current system, etc., are provided along with diagrams, tables of characteristics, and formulas. Brown Instruments Div., Minneapolis-Honeywell Regulator Co.

The Reader Service Card at left needs no postage. Just circle item numbers of all bulletins wanted, fill in name etc., detach and mail.

131 **Temperature Transmitter**—Bulletin A-706 describes the T2T temperature primary element transmitter as a resistance thermometer temperature element designed to operate in conjunction with manufacturer's Autronic controlling recording system. Illustrated with photos, line drawings and diagrams showing principles of operation, bulletin includes temperature spans, dimensions. The Swartwout Co.

132 **Panel Planning Ideas**—The engineering and economical planning of modern combustion and process control panels is discussed in 8-pp Bulletin 170. Numerous panel designs, fashioned for control, are illustrated along with the most up-to-date methods of tubing and wiring. A section on accessories helps make this a valuable source book of ideas for control station planners. Bailey Meter Co.

PUMPS, COMPRESSORS

133 **Pumps for Industry**—Industrial Catalog I-32 contains 96 pp of illustrated information about numerous types of pumps

(Continued on page 167)

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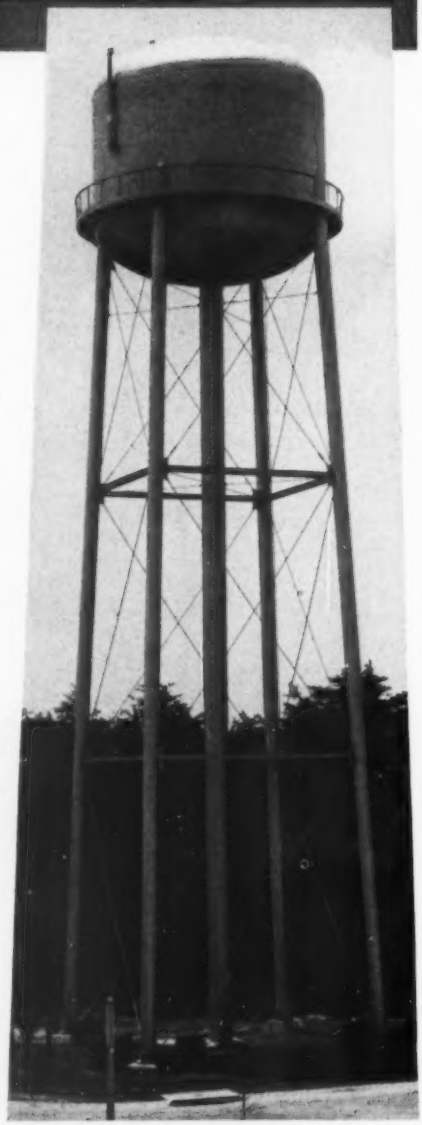
The Hatch Mill Corporation, a subsidiary of Deering-Milliken Mills, produces fancy woolen goods at its plant in Columbus, North Carolina. A 125,000-gal. Horton elevated tank is providing the mill with a dependable gravity pressure water supply. One half of this supply is held in reserve for fire protection while the other half is used for general mill service.

The Horton tank helps provide fire protection for the mill by supplying water to a sprinkler system that covers the complete 204,000 sq. ft. of floor space. If a fire starts anywhere in that area, sprinkler heads adjacent to the blaze open and quickly quench the flames.

Horton elevated tanks are providing economical water supplies for fire protection and general service to industries both large and small. Dependable gravity pressure and easy, economical maintenance make them prime favorites with all.

Horton ellipsoidal-bottom elevated tanks are available in capacities from 15,000 to 500,000 gallons. Radial-cone bottom tanks are available in capacities from 500,000 to 3,000,000 gallons. For further information, estimates or quotations, write our nearest office. There is no obligation.



125,000-gal. Horton elevated tank at Hatch Mill Corporation's plant in Columbus, N. C.

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Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PA.

For more facts circle 529 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 30)

when connecting to standard steel pipe and fittings.

The pipe material cuts easily with ordinary hand saw. Set-ups may be dismantled and all components used over and over again—alterations in any set-up can be made in minutes.

Although semi-rigid, the pipe is flexible enough to permit broad radius bends and considerable misalignment. Sizes up to 2 in. have a working pressure of 100 psi at 100 F. *From a release for Elmer E. Mills Corp., Chicago, Illinois.*

Cold Welding

A METHOD of welding aluminum at room temperature has recently been developed and has created considerable interest, although few applications have been made as yet.

The process is suitable for aluminum and copper, although other metals have also been cold welded. No heat is used from any source. By proper arrangement of work pieces and dies, sufficient pressure is applied to cause ductile metals to flow at room temperature, bringing the work surfaces into intimate contact so that a genuine weld is made.

The process has been explained in this manner: As the two work surfaces to be joined are brought together and pressure is applied, these surfaces are sealed off from the atmosphere. Then as further pressure is applied, the dies are so shaped as to cause the metal at the surfaces to move sidewise or "grow" sidewise. This action in turn exposes clean fresh metal from below the contact surface of each part.

Since this metal is not exposed to air, continued application of force causes these new metal surfaces to join each other producing a true weld with a continuous single grain structure.

It is evident that the process can be applied only to metals sufficiently ductile to flow readily. Not more than 3 per cent manganese or silicon can be tolerated in aluminum alloys to be cold welded.

Heat treatable alloys such as 17 S and 24 S can be joined in the soft temper and subsequently allowed to harden (age at room temperature) in the usual way. *From Reynolds Metals Technical Advisor, published by the Reynolds Metals Co., Louisville 1, Kentucky.*

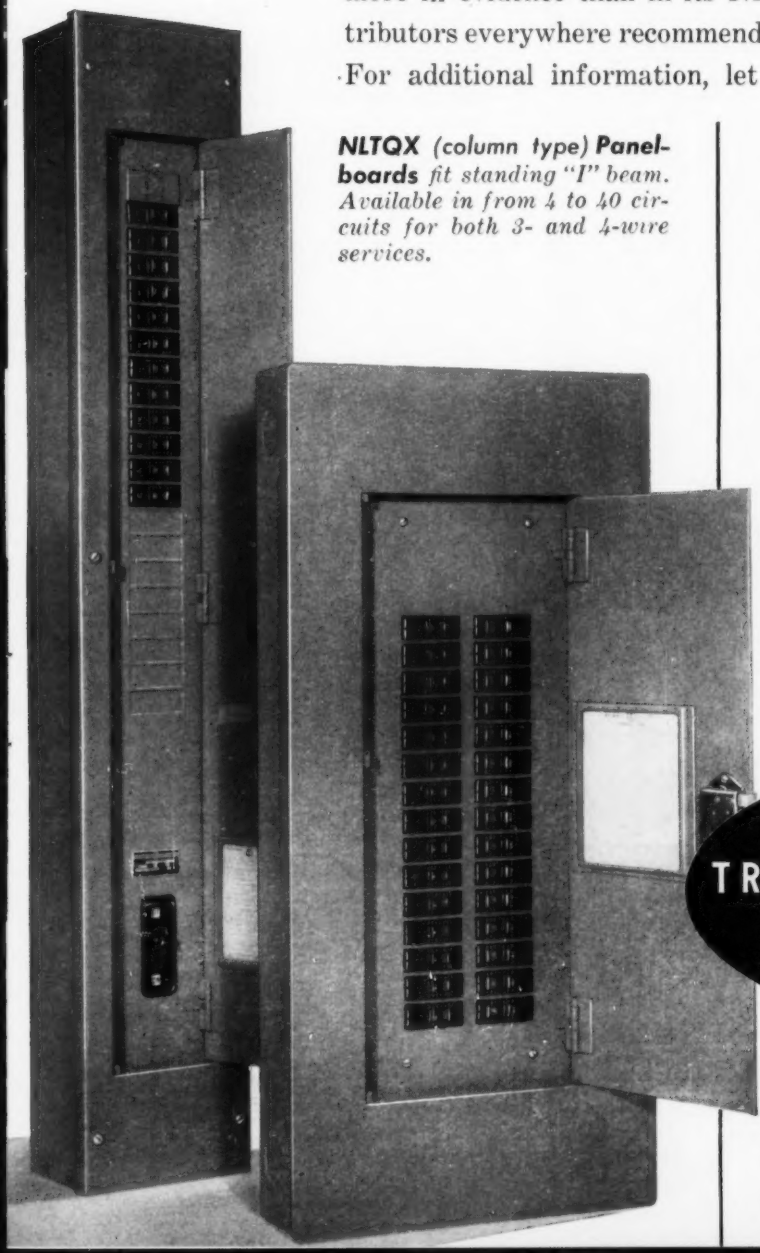
Wire Reels—Wooden or Welded

OLD FASHIONED wooden spoked automobile wheels are practically made-to-order to serve as wire reels

PICK TRUMBULL NLTQ LIGHTING PANELBOARDS

..for more convenience in less space with maximum protection and flexibility for future needs

Trumbull's fifty-year leadership in panelboards has never been more in evidence than in its NLTQ line. Leading electrical distributors everywhere recommend them and carry complete stocks. For additional information, let us mail you Bulletin TEB-14.



NLTQX *(column type)* **Panelboards** *fit standing "I" beam. Available in from 4 to 40 circuits for both 3- and 4-wire services.*

3 WAYS BETTER...

1. Circuit breaker convenience and protection. Type TQL. Quick-make, quick-break. Thermal-magnetic trip, arc-quenching design and trip-free action for top protection. Convenient plug-in design and manual re-set. Equally important, it has a separate trip indicating position.

2. Strong compact interiors readily removable for fast installation. Busbars molded in plastisol, and braced against damage from current surges. Run cooler than in open air.

3. Compact boxes, protected fronts. Adequate knockouts and gutters. Front integral with barrier. Breaker knockouts in front panel to provide for future circuits.

TRUMBULL (T) ELECTRIC

DEPARTMENT OF GENERAL ELECTRIC COMPANY
PLAINVILLE, CONN.

NLTQ Panelboards *available in from 4 to 42 circuits for both 3-wire and 4-wire services with lugs only or Trumbull 50 to 225 ampere breakers in the mains, and TQL 120 volt, 10 to 50 ampere circuit breakers on branches. AC only. Underwriters' Laboratories, Inc. listed.*

when servicing costs are HIGH as the LIGHTS...

Lower both Costs and Lights with Thompson Hangers!

Only **THOMPSON** disconnecting and lowering hangers permit safe low-cost floor-level servicing of high-bay lights. There's no need to use scaffolding, ladders or other awkward, time consuming equipment to maintain peak lighting efficiency . . . service man cleans and relamps the lowered fixtures quickly and easily. **THOMPSON** hangers also eliminate electrical dangers because lowered fixtures are "dead".

To maintain around-the-clock lighting efficiency, establish new safety records and bring your servicing costs down to earth, install **THOMPSON** Hangers!

1035 TE

Write today for new illustrated Bulletin TH-52 for additional details.

1. DISCONNECT 2. LOWER 3. SERVICE 4. REPOSITION 5. REPEAT

THE THOMPSON ELECTRIC CO.

1165 Power Avenue • Cleveland 14, Ohio

For more facts circle 531 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 30)

for use with automatic electric welding heads.

Such a reel fixture can be made in the shape of a T frame, with a

Wooden spoke auto wheels mounted on pedestal frame serve as wire coil holders

wheel mounted on each end of the cross-bar. The original bearings in the wheels provide smooth rotation while a pressure pad against the brake drum affords the desired drag to keep uniform tension on the wire. Slotted side brackets secured by lug bolts simplify coil changing. The vertical member of the T frame is made of telescoping tubing, drilled

Shop-fabricated reel designed to fit coil diameter, knocks down to replace coil

and pinned for a range of height adjustments.

The virtue of the wooden wheel spokes is their ability to isolate welding current by effectively insulating the welding wire from the machine frame.

For coils of wire that do not fit the wooden wheels, a design for a shop-fabricated reel is offered. This reel, secured with wing nuts, is easily knocked down to receive a coil

Window Panes Aren't Expensive But REPLACING Them Costs a Lot

How much does it cost to replace a broken window in *your* plant? Surveys show that the average cost, including labor—the big item—is $3.00 for a single 12″ x 18″ pane. The prevention of window breakage can mean a sizeable reduction in maintenance costs.

A good way to prevent breakage is to glaze with PLEXIGLAS acrylic plastic. This light weight, durable, *outdoor* plastic has the strength and resilience to withstand the enemies of industrial glazing—impact, twisting, and vibration.

PLEXIGLAS is available as clear transparent material, and in transparent and translucent colors which reduce direct sky glare, provide excellent diffusion of daylight, and curtail solar heat.

SEND FOR NEW BOOKLET. Our new brochure "Window Glazing with PLEXIGLAS", describes the advantages of this glazing material, and outlines installation methods. We'll be glad to mail you a copy.

CHEMICALS FOR INDUSTRY

ROHM & HAAS COMPANY

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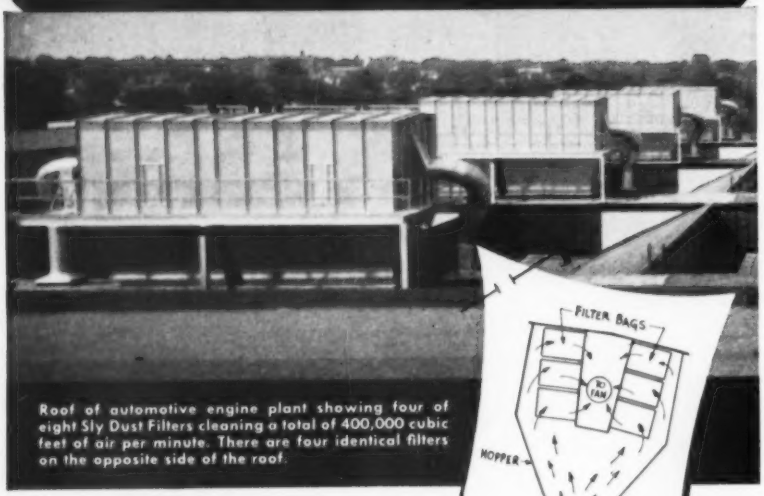
Canadian Distributor: *Crystal Glass & Plastics, Ltd., 130 Queen's Quay at Jarvis Street, Toronto, Ontario, Canada*

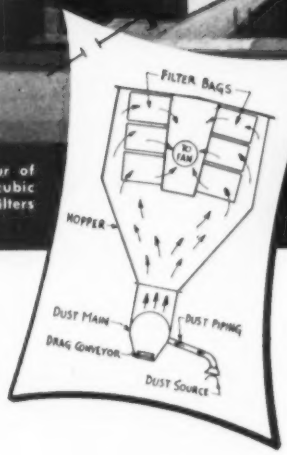
PLEXIGLAS is listed in Sweet's Plant Engineering File, Section 4a/Ro

SLY PIONEERS & LEADERS

INDUSTRIAL DUST CONTROL



Roof of automotive engine plant showing four of eight Sly Dust Filters cleaning a total of 400,000 cubic feet of air per minute. There are four identical filters on the opposite side of the roof.



DUST...

RECLAIMED—
RE-MELTED—
RE-USED

Here are four of the eight Sly Dust Filters which exhaust the dust from milling machines in a large automotive engine plant.

Dust from machining engine blocks and other operations, is exhausted into hoods over the machines, thence into mains and through the hoppers into the filters; the collected dust drops into hoppers thence into the mains and is re-claimed —briquetted, and re-melted.

Aside from the recovery of valuable materials, the use of Sly Dust Filters results in a clean plant and better working conditions.

Because of their larger filtering capacity and easy replacement of bags, Sly Dust Filters offer definite advantages in economy of operation and lower maintenance.

If you will tell us your dust problem we shall be glad to tell you what can be done about it and give you an estimate of cost.

THE W. W. SLY MANUFACTURING CO.

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For more facts circle 533 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 30)

of wire, and a T frame, similar to that for the wooden reels, can be built to support two of the metal reels. *From Fusion Facts, published by the Stoody Company, Whittier, Calif.*

Chisel Care

TOOLS, whether they belong to a company or an individual, should be treated with the care and attention that they deserve. One type that finds common use in plants is the flat cold chisel.

There are several things to remember about the use of chisels. Hardening gives a chisel the ability to cut metal. But after it is hardened, it must be tempered. Otherwise, the cutting edge would be so brittle that it would probably break the first time it was used.

The cutting edge of the chisel should be sharp in order to cut properly. It is sharpened by dressing on an emery wheel. When dressing a cutting edge, the original angle should be maintained as closely as possible. Grinding a small amount at a time from each side is recommended.

Overheating of the edge should be avoided. It should be dipped into water often enough to be kept cool. Otherwise, the temper will be drawn and the cutting edge will be soft and the chisel useless until it is rehardened and tempered.

After dressing the cutting edge, the other end of the chisel should be inspected. Sometimes it becomes "mushroomed"—spread out like an umbrella—as a result of hammering. If a chisel is used in this condition, pieces may fly off the head and cause serious injury to someone. *From The Westerner, published by the Olin Industries, Inc., East Alton, Illinois.*

Drill Designed for Plastics

IN THE PAST few years the development of plastics for industrial use has moved at an extremely fast pace.

The new plastics which incorporate mineral fillers and special binders have brought about an increasingly difficult job of drilling. The harsh abrasive action of the fillers generally means short life for the cutting tool.

To overcome this objection and to get an even better drill for the purpose, Mr. Robert Double, Westinghouse Manufacturing Engineer, set about developing a drill specifically for hard or abrasive plastics.

It was found that flutes such as are found on standard twist drills

SERIOUS PRODUCTION LOSS STOPPED BY SWITCH TO SUNVIS H.D. 700 OILS

VARNISH NO OBSTACLE—This is one of the many presses of various sizes which form joints in abrasive sanding belts for production use in the automobile, jet engine and woodworking industries, as well as many others. Six years ago equipment like this press needed costly maintenance at frequent intervals because of varnish formation. Then a Sunvis H.D. 700 Oil was adopted as the hydraulic medium, and the trouble disappeared like magic.

NO OIL CHANGE—This large press is used for joining abrasive belts used in polishing stainless steel. Although the oil temperature at which it operates is 130 F, the 200-gallon charge of Sunvis H.D. 700 is still in excellent condition after nearly four years' use.

Among the 30,000 types of abrasive specialties made by Behr-Manning Corporation, Troy, N.Y., Division of Norton Company, are sanding belts requiring smooth, uniform joints. Dozens of hydraulic presses, ranging in capacity from 5 to 150 tons, form the joints to the same thickness as the belts.

The hydraulic oil in use six years ago created a production obstacle by forming varnish in the pumps and valves. At least once a year the systems had to be overhauled and the pumps sent to the manufacturer for repairs, with consequent production loss.

Behr-Manning then changed to Sunvis H.D. 700 Oils, as suggested by a Sun representative. Because of the detergent-dispersive characteristics and high stability of these oils over a wide range of speeds, loads and temperatures, varnish formation was immediately cleared up. Since that time, no overhauls traceable to oil have been necessary. Annual savings in pump repairs have been substantial and no oil changes have yet been required.

For complete information about "Job Proved" Sunvis H.D. 700 Oils, fill out the coupon below.

SUN OIL COMPANY, Dept. PY-2
Philadelphia 3, Pa.

We are having trouble that may be caused by an inadequate hydraulic oil.

☐ Please send me booklet "Sunvis H.D. 700 Oils."

☐ Please have a Sun representative contact me.

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• Here's a check list of the complete line of WRIGHT Hoists that will show you the many models available for a wide variety of lifts around shop or plant.

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Hand-operated Equipment

STYLE — TON CAPACITY

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- ☐ Top running, hand traveling ..... 1 to 20
- ☐ Underhung, hand traveling ..... 1 to 10

HOISTS

- ☐ Wright Safeway, light, portable ..... ½ to 4
- ☐ Wright Safeway Clevis-connected ..... ½ to 4
- ☐ High Speed, improved ..... 5 to 50
- ☐ Handwheel, extended ..... ¼ to 3
- ☐ Twin hook ..... ¼ to 10
- ☐ Differential ..... ¼ to 1½

TROLLEY HOISTS

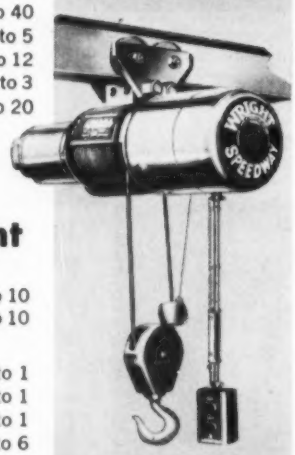
- ☐ Wright Safeway Army type ..... ½ to 3
- ☐ Improved Army type ..... 4 to 10
- ☐ Hi-Way 600 type ..... 1½ to 24

TROLLEYS ONLY

- ☐ Timken ..... ¼ to 40
- ☐ Hyatt ..... ¼ to 5
- ☐ SARB ..... ¼ to 12
- ☐ Wrightway ..... ½ to 3
- ☐ Double beam ..... 2 to 20

WRIGHT SAFEWAY

WRIGHT SPEEDWAY



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Motor-driven Equipment

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HOISTS

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- ☐ Frame 1, Speedway, long-lift ..... ¼ to 1
- ☐ Frame 2, Speedway (all suspensions) ..... ½ to 6
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for Information on the complete line of WRIGHT ELECTRIC HOISTS write for Catalog E-50A

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WRIGHT Hoists Trolleys Cranes

For more facts circle 535 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 30)

were a detriment in the drilling of plastics. The flutes continually clogged with chips and gum deposits. The friction on the drill increased considerably and the drill soon overheated. This overheating reduced tool life.

After much experimentation it was found that a spade head drill with a shank 40 per cent of the diameter of the nominal hole size produced a drill with optimum qualities.

The drill bit is a piece of preformed tungsten carbide brazed into

Common type of drill with flutes is compared to one developed for plastics

a slot cut in a minimum amount of supporting tool steel on the end of a relatively small shaft.

It was found that the drill could successfully cut plastics and other relatively soft materials such as wood, fiber, at amazing speeds and with very long life. Many holes have been drilled to 10 or 12 drill diameters in depth without retracting the drill. This is far beyond the depth normally considered to be deep-hole drilling.

For normal usage in the shop it is recommended that the drill be run at the highest speed of the drill press and fed by hand at a very rapid rate. *From an article by W. H. Dickinson in Westinghouse Maintenance News, published by Westinghouse Electric Corporation, Pittsburgh, Pennsylvania.*

Elevated Building

A GOOD EXAMPLE of using air rights, when lateral expansion space is limited, is incorporated in a building recently erected for A. O. Smith Corporation of Milwaukee, Wisconsin. Actually this building stands on "stilts."

This type of construction permits the continued use of small buildings over which the new building has been erected. In addition, practically

View shows how this type of construction allows the small buildings to remain standing. It also leaves space underneath for outdoor storage service

the entire space formerly used for storage purposes has been retained.

The size of the research office building is 90 by 381 ft with the first floor being 34 ft from grade. There are two stairways leading to grade and also a bridge which makes the adjacent building easily accessible.

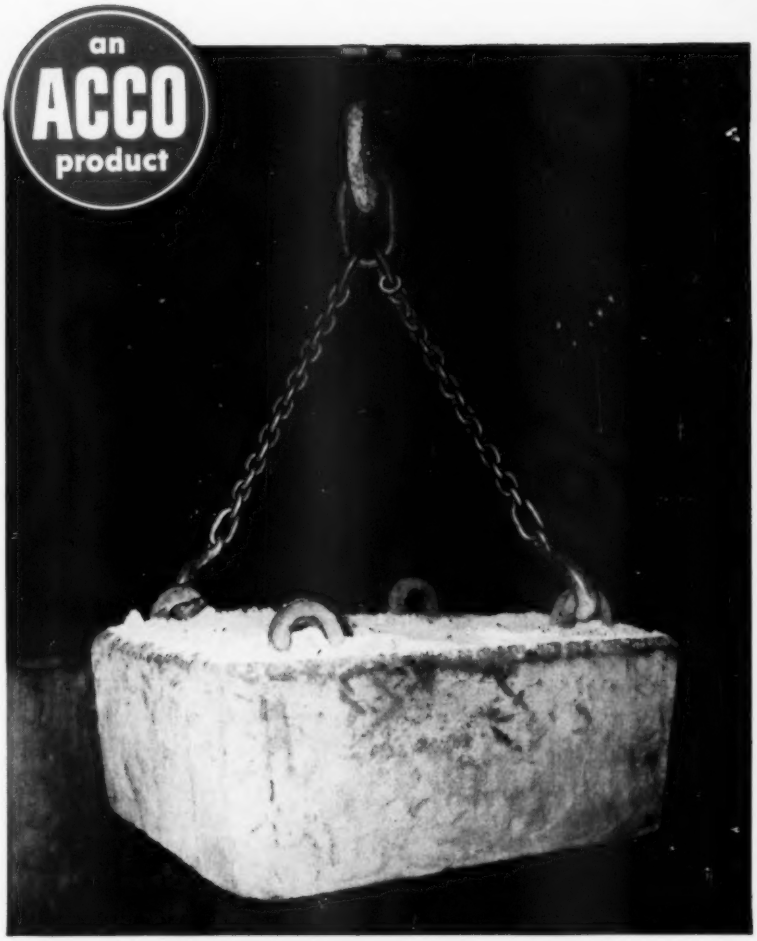
The outside of the building is covered with aluminum siding. A continuous arrangement of thermopane windows is used in this completely air conditioned building. *From information furnished by Harvey Dreier of Wisconsin Bridge & Iron Co., Milwaukee, Wisconsin.*

Baffle Prevents Eye Injury

SMALL METAL chips and other foreign particles can seriously impair the accurate performance of air line lubricators, air pressure regulators and other precision air control valves in the field.

So, air blow guns are used extensively in parts assembly operations

Baffle, normally used in air line filter, acts as a deflector on end of air line employed for component parts cleaning



Why Workmen Like ACCO Registered Sling Chains

• One rigger said: "It's a neat factory-made unit that we know is made properly." A foreman said: "My men look for the identification ring. It's sort of a safety indicator."

Every ACCO *Registered* Sling Chain is built and tested as a unit and bears the ACCO identification ring. The sling illustrated above has ACCO Foundry Hooks designed for use on casting molds which get very hot. It is engineered for this particular job and will give long service. It is one of the many types of *Registered* Sling Chain made by AMERICAN to handle safely all kinds of lifting jobs.

Check today with your AMERICAN CHAIN distributor who will help you decide on the correct ACCO *Registered* Sling Chains for your use. Or, write our York, Pa. Office for a copy of **DH-314** ACCO *Registered* Sling Chain Catalog.

ACCO

AMERICAN CHAIN DIVISION
AMERICAN CHAIN & CABLE

TRADE MARK

York, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Bridgeport, Conn.

American Chain

For more facts circle 536 on Reply Card

SHARP & DOHME Reports:

ERIEZ PERMANENT MAGNETIC SEPARATORS ASSURE CONSTANT INSULIN PRODUCTION

Extraction of insulin at the Philadelphia plant of Sharp & Dohme, Inc., starts with the grinding of beef pancreas glands. To prevent nails, bolts, wire and other tramp iron (see insert illustration) sometimes accumulated in packing and shipping of glands from getting into the pancreas grinder, two ERIEZ plate-type magnetic separators are suspended over the conveyor line. The Alnico V magnets remove tramp iron each day from the pancreas glands . . . prevent damage to the cone, worm and cutter of the grinder, and eliminate possible lay-off of men during machine downtime. Vital production of insulin at Sharp & Dohme is *never* stopped because of tramp iron inclusions!

Plate-type Separators, hinged for easy cleaning of ferrous contamination, remove tramp iron daily from beef pancreas processing line.

Eriez permanent (non-electric) plate-type magnetic separators, built in a full range of sizes for chemical processing lines, assure you that strength for strength . . . size for size . . . dollar for dollar . . . no ordinary permanent magnet compares!

Here are 5 features found only in Eriez permanent magnetic separators:

1. Protective cover prevents tampering and accumulation of iron on backs of castings with consequent shorting of magnetic circuit.
2. All units complete, for wood or steel installation . . . no adaptations required.
3. Continuous hinge means easy and lasting installation.
4. Powerful Hyflux Alnico V gives greatest possible magnetic strength.
5. Riveted construction adds rigidity . . . increases structural strength.

Write for FREE 16-page Catalog 15 which describes 25 different Magnetic Separators for the chemical industry.

ERIEZ MANUFACTURING COMPANY

15 Magnet Drive • Erie, Pennsylvania

"Buy Permanent Protection . . . by ERIEZ"

For more facts circle 537 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 30)

by the C. A. Norgren Co. of Englewood, Colorado.

Through the company's suggestion system, an alert employee submitted an idea that prevents eye injuries on air cleaning operations. He took one of the plastic baffle plates which are used on the air line filters and attached it between the body and the removable tip of a blow gun.

The clear plastic plate not only deflects flying particles away from the eyes but enables a worker to see the part that he is cleaning.

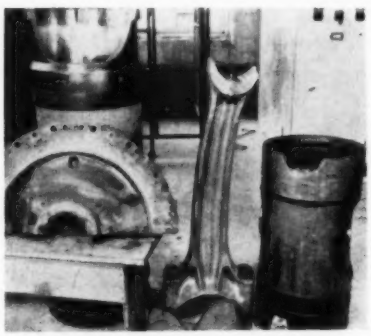
This idea helps eliminate the production time loss because of eye injury. Besides, it is easier to install these plates on blow guns than it is to get workers to use goggles when air cleaning parts. *From a release of C. A. Norgren Co., Englewood, Colorado.*

Water Bends Connecting Rod

ABOUT ½ HR before the accident, the 1700 hp dual-fuel engine had been shut down so that a spark plug could be replaced.

After the new plug had been installed, starting air was applied and the engine began to turn over. But before fuel and ignition had been turned on, the engine jolted to a sudden stop.

It was found that cooling water, leaking through an unsuspected crack in the supercharger during the



This is what happened to connecting rod after piston hit water in cylinder

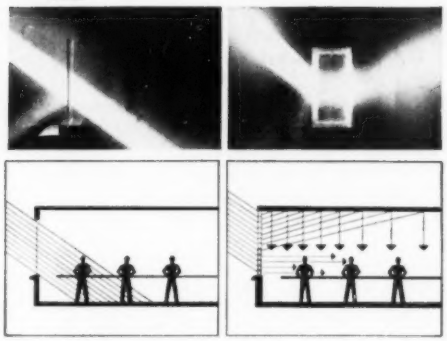
shutdown, found its way into No. 4 cylinder.

Then, when the piston came up under the pressure of starting air, it hit the liquid obstruction with sufficient force to bend the connecting rod and force it over to break pieces out of the piston skirt and cylinder liner. *From The Locomotive, published by The Hartford Steam Boiler Inspection and Insurance Co., Hartford, Connecticut.*

INSULUX
FENESTRATION
SYSTEM

Above photos show plant of Goldenrod Ice Cream Co., Chicago, before and after Insulux Glass Block replaced expensive-to-maintain windows.

Before daylight engineering... NOW! Daylight Engineered



Direct sun causes uncomfortable brightness near windows, extreme contrast in other parts of room. Insulux Fenestration directs and spreads daylight to ceiling, keeps brightness at comfortable levels.

Daylight Engineering can help you plan an Insulux Fenestration System which will more effectively daylight your buildings.

The new Insulux light-directing glass blocks virtually "turn your building with the sun," catching light rays in the morning, at noon, and in the afternoon, directing them to the ceiling. Then they are reflected throughout the inside area.

Insulux Glass Block neither rust, rot nor corrode . . . They have high thermal insulation value . . . seal out dust, dirt and prowlers . . . improve your building's appearance . . . cut maintenance, heat and light costs.

Supplies of Insulux Glass Block and all of the installation materials needed are noncritical and immediately available in quantity.

Before replacing broken windows, rusted or rotted sash, consult a Daylight Engineer about the benefits of an Insulux Fenestration System. For a free consultation, write Insulux Glass Block Div., Kimble Glass Company, Dept. PE-2, Box 1035, Toledo 1, Ohio.

KIMBLE GLASS COMPANY

Toledo 1, Ohio

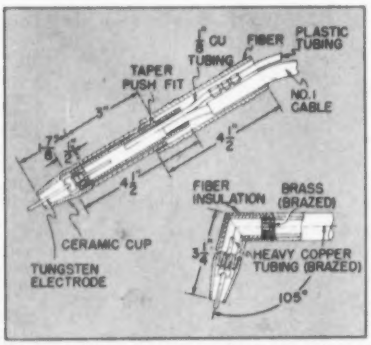
Subsidiary of Owens-Illinois Glass Company

OPERATION & PRODUCTION pointers for the industrial plant engineer

Edited by H. E. B. Anderson

Air-Cooled Welding Torch With Quick-Change Electrodes

AN AIR-COOLED, dual-head, inert gas shielded arc welding torch, with an electrode changing feature, has been designed at the U. S. Naval



Cross-section diagram shows construction of torch with removable holders

Engineering Experiment Station Annapolis. The electrode can be changed from a fixed angle of a 105 deg to a 180-deg position without disconnecting the gas and power lines.

The torch is small and light, constructed basically of insulating fiber and copper tubing. The handle has two detachable electrode holders, one straight and one angled.

To change the electrode angle from 180 deg to 105 deg, the straight electrode holder and the ceramic cup are removed. The angular tip is substituted by attaching it to the threaded connection from which the ceramic cup was removed. The new holder greatly improves on the former method, which required changing the entire holder together with its gas and power leads.

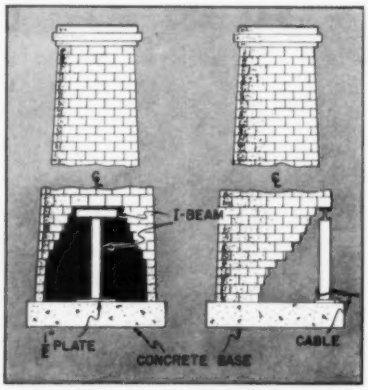
Stack Wrecked—From the Bottom

Contributed by H. N. Josleyn

DURING THE DEMOLITION of a municipal gas plant a brick chimney was toppled over to land in a predetermined position on the ground. Close proximity of a permanent building, high tension power lines, and a through line railway track made accuracy imperative.

The bricks and binding on the upper half of the stack had deteriorated to such an extent that the usual method of dismantling from the top down, brick by brick, was unsafe and impracticable.

A line was marked on the stack in a direct line with the determined final position on the ground. Using this line as a center, a rectangular hole approximately 4 ft by 7 ft was cut into the stack. A short piece of suitably sized I-beam was placed across the top of this opening and supported by an upright beam of the same material, the bottom end resting on a ½ in.-thick metal plate lying on the concrete base. In doing this the short horizontal I-beam and upright were centered up with the vertical mark on the stack. The bottom half-inch plate prevented the



Beams hold stack in place as wedge is "chopped" to guide fall of old stack

upright beam from cutting into the concrete base and also facilitated the final operation of toppling.

Keeping the marked line as a center, an equal number of bricks was removed from each side making an opening that tapered down diagonally to the base. The completed excavated hole reached around the stack to points a little more than 90° in either direction.

Woven Wire Slings Add Safety, Ease to Repair Shop Handling

SLINGS MADE OF WOVEN WIRE are proving of value to the Herr Electric Co., Baltimore, in handling heavy, bulky motors and parts through their repair shop. With the slings wrapped around the loads in a noose hitch, slippage is no longer a problem.

Positioning in the lathes, also, has been improved. One man does the work that often required 2 or 3 men to do with ordinary slings. The danger to the operator and to the armature has been eliminated, and important time savings have resulted since the innovation of the woven wire slings. Also, damage to motor windings has been reduced.

Arriving at the shop, a motor is picked up from the truck

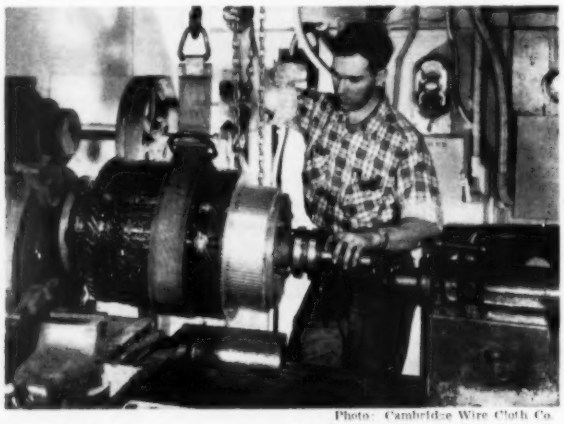
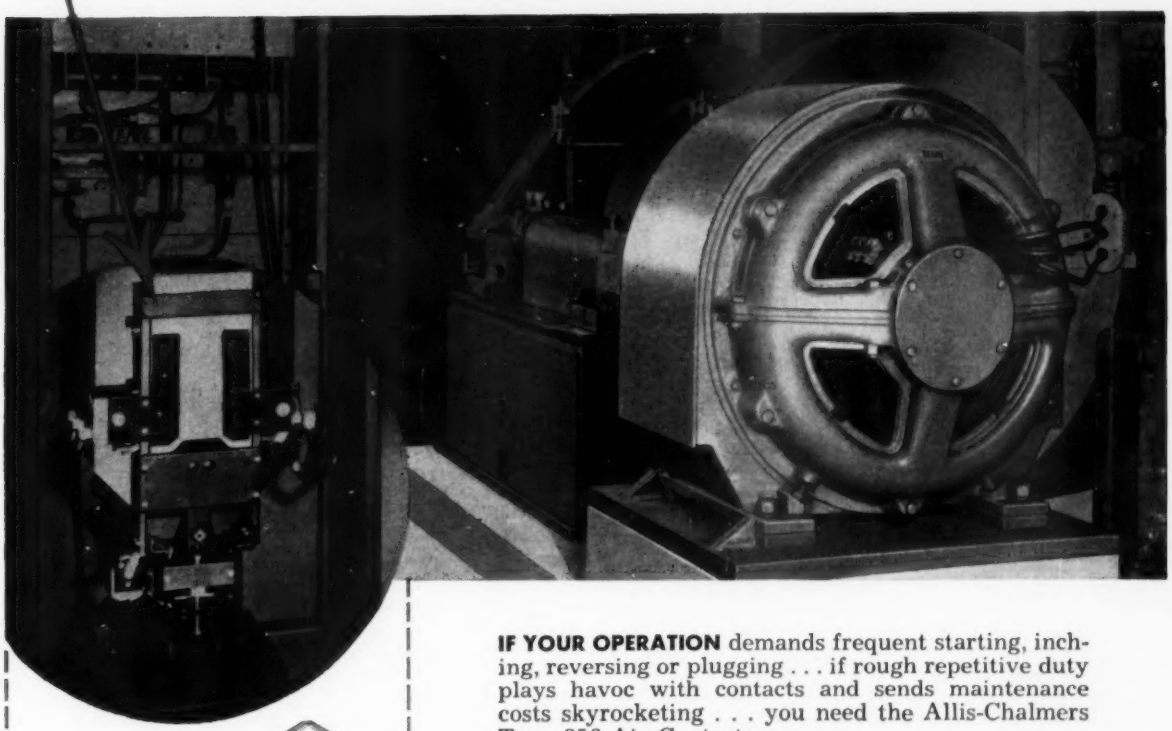


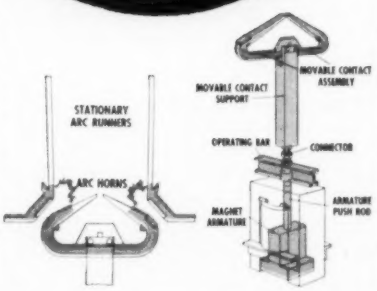
Photo: Cambridge Wire Cloth Co.

Positioning an armature in the lathe is simplified with sling

ALLIS-CHALMERS
TYPE 256
Air Contactors

CUT Maintenance Cost





Double-break contacts, vertical action, dual blowout structure and other features speed arc extinction . . . assure long life and low maintenance.

IF YOUR OPERATION demands frequent starting, inching, reversing or plugging . . . if rough repetitive duty plays havoc with contacts and sends maintenance costs skyrocketing . . . you need the Allis-Chalmers Type 256 Air Contactor.

No Turning Shafts — No Shaft Bearings

The elimination of turning shafts, shaft bearings and flexible contact leads minimizes mechanical wear. Double-break contacts of arc resistant alloys, *operating in air*, straightline vertical action and fast arc extinction add months of contact wear. Actual case histories of "once-a-minute interruption" duty have revealed little contact wear in a full year's operation.

Replacement Units

Compact design permits installation in a cubicle used for oil immersed units in existing starters. And, of course, the Type 256 Air Contactor is also available in Allis-Chalmers Type H Starters.

Call your nearby A-C representative or write for Bulletins 14B7303 and 14B6410. Allis-Chalmers, Milwaukee 1, Wisconsin.

A-3945

A-C ALLIS-CHALMERS

ALLIS-CHALMERS

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Care was taken to keep the angles of taper equalized on either side of the upright while at the same time removing an equal volume of material.

A steel cable from a power winch was fastened around the upright I-beam. A pull on the cable pulled out the beam and toppled the stack directly into the predetermined position on the ground.

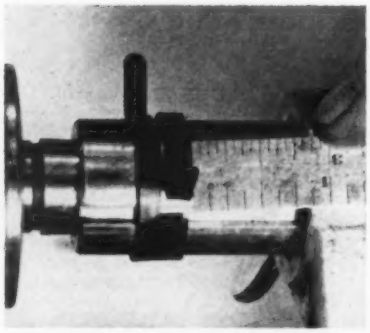
Lathe Drilling Gage

Contributed by F. E. Riley

DRILLING to a specified depth with a stationary drill held in the lathe tailstock chuck can be simplified by using a simple gadget which provides accurate depth measurement.

A metal clip, made from a strip of 3/8 in. by 1/32 in. spring steel is slipped over the tailstock barrel. Two lugs—one at each end of the clip—release the clip from the tailstock barrel when squeezed together, and allow the clip to be adjusted to any desired position on the barrel.

One of the lugs also serves as an edge against which the end of a rule may be placed for measuring. As the tailstock barrel traverses during the drilling, the hole depth



Clip provides edge for measurement of hole depth between clip and tailstock

can be read with a rule at any time, between the clip lug and the face of the tailstock.

When the hole is started, the clip is slid against the front face of the tailstock. It then traverses with the tailstock barrel, indicating the depth that the drill has penetrated.

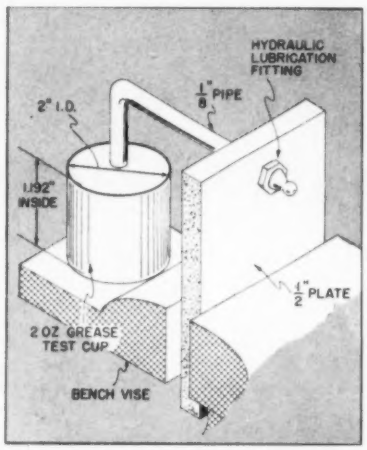
Calibration of Grease Guns Saves Time, Prevents Waste

Contributed by Sidney P. Johnson
Mechanical Engineer, Bureau of Ships

MAINTENANCE CHARTS call for a certain quantity of grease, expressed in cubic inches or ounces, to be pumped periodically into a bearing housing through a grease fitting. It is difficult to determine this amount unless the grease gun has been calibrated, because the grease going into the bearing cannot always be seen.

To prevent over-lubrication, hydraulic fittings have been frequently removed, and old-style hand screw-down grease cups have been used. The modern hydraulic grease fittings are easier, faster, and cleaner, but care must be taken to control the number of strokes during the operation of the grease gun.

Proper lubrication requires the right amount of grease at the right spot, at the right time. Too little, too late, is disastrous. Too much, too soon is also troublesome, not to mention the loss of material and time, in addition to the messy result. If grease guns are properly calibrated, equipment can be lubricated more intelligently by using the method outlined in the following paragraphs.



Calibration chart recommended for each grease gun gives quick stroke count

Grease guns from various manufacturers have different piston diameters and lengths of stroke, generally giving different volumes per stroke. However, if each grease gun is calibrated, the number of full strokes required to pump a desired amount of grease is definitely known.

The following procedure for calibrating hand-operated grease guns is suggested:

a. Assemble plate, pipe, and fitting in a suitable vise.

b. Fabricate container for 3.75 cu. in (2 oz.) of grease.

c. Fill pipe and fitting with grease. Wipe end of pipe clean.

d. Fill grease gun with grease and remove air. Be sure gun is working properly.

e. Fill the empty container with grease, using full strokes of the gun, and count each stroke. The total number of full strokes required is the container stroke count.

f. Fill the container 3 times. The average number of strokes required per filling is the final container stroke count.

g. The final container stroke

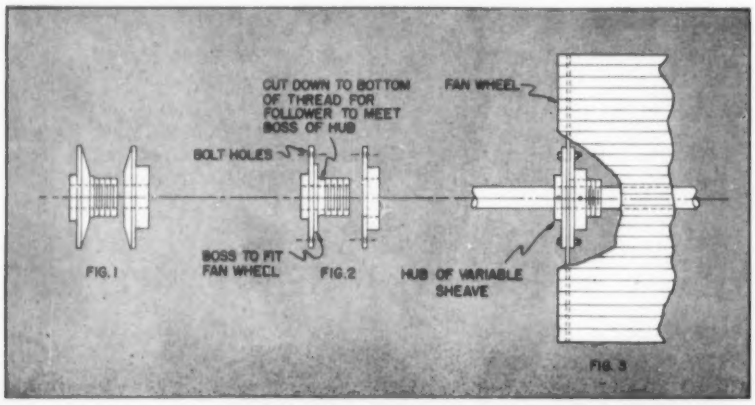
Variable V-Belt Sheave Altered to Repair Fan Wheel Hub

Contributed by William Steindl

A HUB SUPPORT on a squirrel cage fan, broken when removing the hubs for a bearing change, can be replaced with a fabricated hub if a standard hub is not available.

Starting with a single-belt variable sheave, Fig. 1, the face of the stationary member is turned down to fit the fan wheel, and the moving member is faced off, Fig. 2. Bolt holes are drilled to match the fan wheel.

The assembly is then fastened to the fan wheel by bolting it to the wheel hub, Fig. 3, and the fan wheel can be reinstalled.


CUT DOWN TO BOTTOM OF THREAD FOR FOLLOWER TO MEET BOSS OF HUB
FAN WHEEL
BOLT HOLES
BOSS TO FIT FAN WHEEL
FIG. 1
FIG. 2
HUB OF VARIABLE SHEAVE
FIG. 3

Series of sketches shows details for adapting sheave to repair fan wheel hub

G-E Hook-on Volt-ammeter Stays Accurate

STURDY DESIGN AND HEAVY-DUTY PARTS ASSURE DEPENDABILITY AND LONG LIFE

Shock-proof construction, built-in magnetic shielding (from fields of adjacent conductors), and temperature-compensated circuits are only three of the many features of this new G-E hook-on that help assure you of sustained accuracy. Strong dovetail joint in the transformer makes errors caused by imperfect closing practically negligible. The convenient and reliable range-selector switch provides positive range switching—enables you to make current or voltage readings quickly and simply.

OTHER NEW FEATURES

A new, easily adjusted pointer-stop mechanism simplifies reading motor-starting currents. In addition, this versatile hook-on has five current scales ranging from 7.5 to 750 amperes; three voltage ranges are 0-150/300/750 volts. Accuracy for all readings is 3%—even on low current ranges.

ONE-HAND OPERATION

Current is measured by simply hooking the jaws of the instrument around the line. Voltage readings can be made by attaching the extra large alligator clips across the line. A flick of the selector switch gives you the desired full scale; and current readings can be taken without removing the potential leads.

NOW AVAILABLE

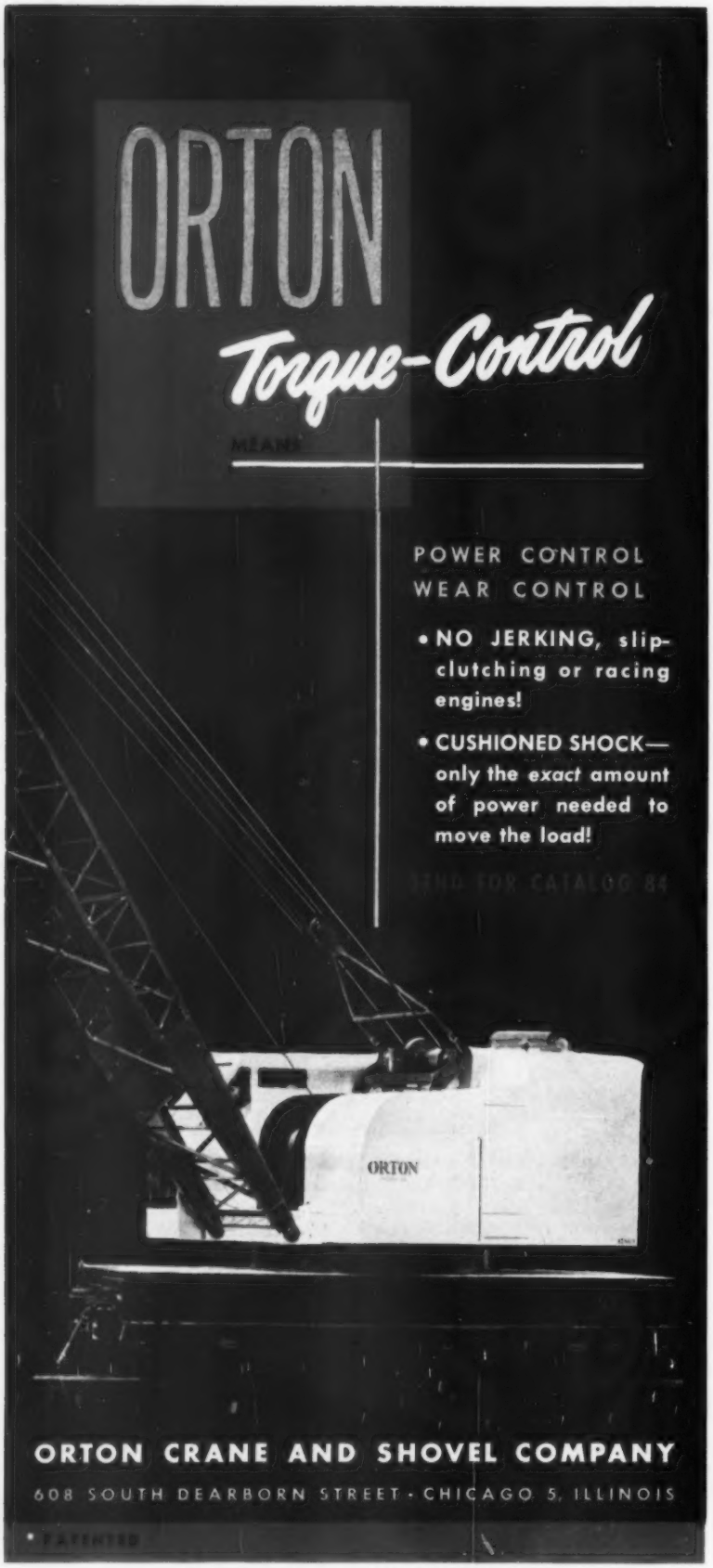
See this newest member of the G-E hook-on family today at your nearest G-E apparatus distributor. No increase in price over the previous model: $66.75*. General Electric Company, Section 602-246, Schenectady 5, N. Y.

*Manufacturer's suggested retail price.

GENERAL ELECTRIC

ADDED RANGES: New higher and lower current ranges (0-7.5/30/75/300/750 amperes) and higher voltage range (0-150/300/750 volts) can be quickly selected with the handy selector switch.

NEW POINTER STOP makes reading of motor-starting currents easy. Using one finger, set stop until pointer barely deflects: the scale reading will then indicate motor-starting current.



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count divided by 2 is the number of strokes required to pump one ounce of grease.

h. The container stroke count divided by 3.75 is the number of strokes required to pump one cubic inch of grease.

i. Enter these values on the grease gun calibration chart. With

GUN NAME _____ STYLE _____
MFR _____ TYPE _____

OUNCES		CUBIC INCH	
OUNCES	STROKES	CUBIC INCH	STROKES
1/16		1/64	
1/8		1/8	
1/4		1/4	
1/2		1/2	
1		1	

CALIBRATION BY _____ CALCULATION BY _____
DATE _____

Calibration set-up for grease gun, made of plate, pipe and fitting, set in vise

the fractional values, use the basic stroke count with the appropriate volume fraction to determine the stroke count for a partial unit of volume. These values are also recorded on the calibration chart. In these calculations, one lb of grease (16 oz.) equals 30 cu. in., thus 1 oz. equals 1.875 cu. in.

A completed calibration chart, kept with the gun it represents, provides a handy means of finding the number of strokes required with that particular gun to lubricate a fitting or bearing where a specified amount of grease is required.

Callboard Speeds Inspection

Contributed by Harold Dettman
Allis-Chalmers Manufacturing Co.

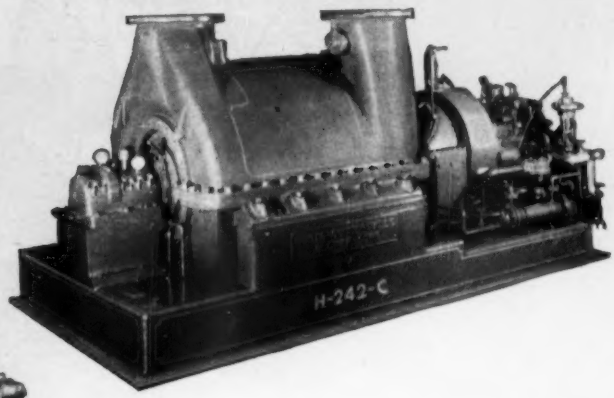
A BLACKBOARD, 18 by 24 in., has been set up in the shop to facilitate the work of shop inspectors.

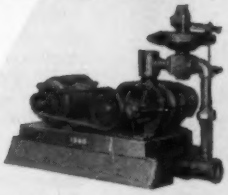
Prior to use of the board, an inspector would be called to the department to check one job. After

Worker requesting inspection of his work adds his name to list on callboard

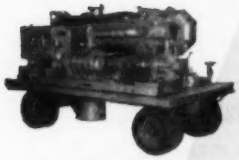
LET *Specialists* DO THE JOB OF MOVING GAS OR AIR

CENTRIFUGAL BLOWERS AND EXHAUSTERS
single and multi-stage units, in capacities from 2,000 cfm to 100,000 cfm or higher, at maximum practical pressures.

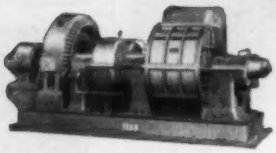




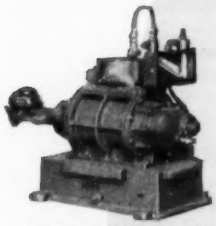
Rotary Positive Gas Pumps
5 cfm to 50,000 cfm.



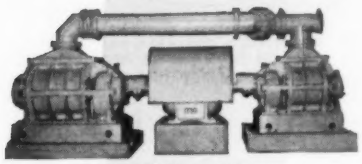
Inert Gas Generators
1,000 cfh to 35,000 cfh.



Rotary Positive Blowers and Exhausters
5 cfm to 50,000 cfm.



Positive Displacement Meters
4,000 cfh to 1,000,000 cfh.



Cycloidal Vacuum Pumps
500 cfm to 13,000 cfm.

One advantage of dealing with Roots-Connersville for blowers, exhausters, meters and related equipment is that we are specialists in this field. It's been our only business for almost a century. Today, we combine this long experience with up-to-the-minute thinking, to supply the most reliable and economical machine for your specific job.

Then, there's the wide versatility of R-C equipment. Our exclusive *dual-ability* line includes Centrifugal and Rotary Positive types, in standard sizes for most work. Because we build both, our recommendations are unbiased.

In our Rotary Positive Gas and Vacuum Pumps and Meters, and in Inert Gas Generators, there's a similar, wide choice in types and capacities, closely matched to specific needs.

We suggest that on *any* problem of handling gas or air at moderate pressure, for industrial purposes, you ask us for definite recommendations. Detailed bulletins are available on request.

ROOTS-CONNERSVILLE

Exclusive Specialists in Handling Gas and Air

BLOWER BUILDERS SINCE 1854

ROOTS-CONNERSVILLE BLOWER

A DIVISION OF DRESSER INDUSTRIES, INC.
253 Planton Ave. • Connersville, Indiana

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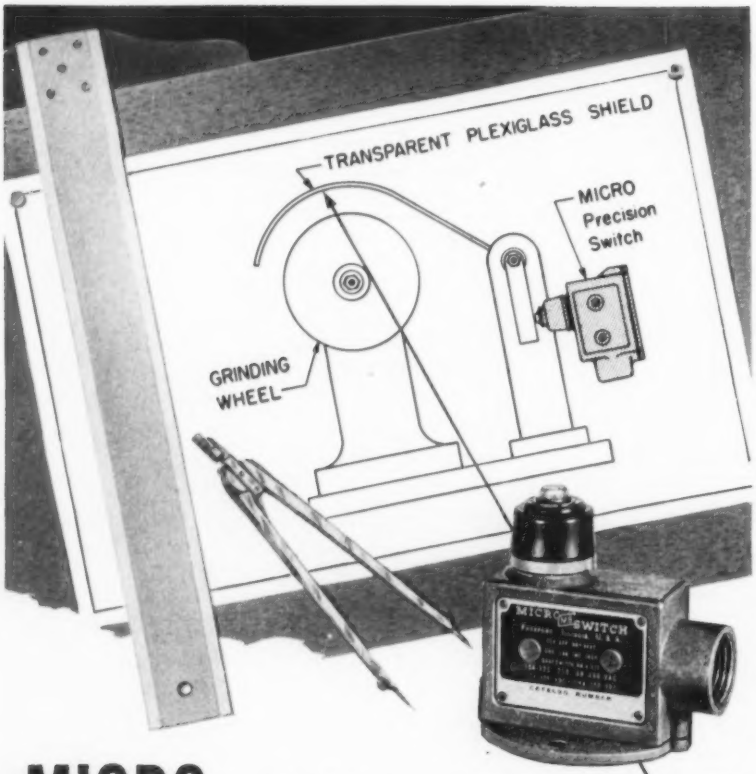

MICRO switch says "no grinding" unless protecting shield is over the wheel

HERE'S a safety use of a MICRO precision switch for almost any plant, protecting eyes and face of grinding wheel operators from flying particles.

Plexiglass shield is linked to the plunger actuator of the MICRO switch which only closes the power circuit when the shield is in the "down" position.

This application of a MICRO switch to a universal plant problem is just one of hundreds of uses that plant engineers, electricians and operating men are finding for these versatile switches.

As limits, safeties and interlocks, they make existing equipment safer, more efficient and more productive. They are available for bottom and side mounting and with actuators to take any kind of actuating motion.

Ask for them at your local authorized MICRO distributor. You will find him under "switches, electric" in your classified telephone book. MICRO field engineers are located in principal cities, too, to assist in the solution of complex switch problems. Call your nearest MICRO branch office.

MICRO
MAKERS OF PRECISION SWITCHES
FREEPORT, ILLINOIS

A DIVISION OF
MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

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OPERATION & PRODUCTION

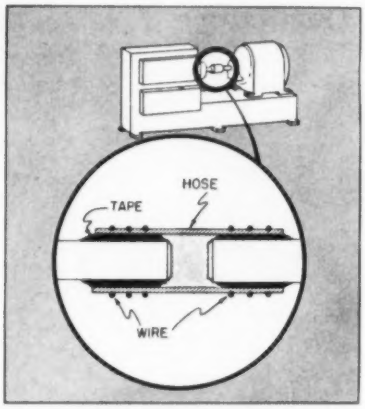
(O and P begins on page 50)

this inspection, he would leave, unaware that men on other jobs had also called for the inspector. Consequently, he had to be recalled to the area.

Now the man who first calls the inspector puts his name on the blackboard. Anyone else requesting the inspector merely adds his name to the board. Upon arrival at the department, the inspector can tell at a glance where he is needed. After the inspections are made, the names are erased, for a future series of calls.

Emergency Flexible Coupling

Contributed by Sidney V. Worth



Rubber hose slipped over taped shafts and wired in place serves as temporary flexible coupling for low power drive

Vapor Drying Speeds Production

MANY PAINTS, inks, and varnishes can be dried almost instantaneously, with a new process developed at the Armour Research Foundation of Illinois Institute of Technology.

Where current industrial drying methods take 2 hours, the new process, called Chem-Dry, does the job in from 2 to 20 seconds. In an investigation to find an improved method of drying decal inks, which take 24 hours to a week to dry, sulfur dichloride vapor proved to be the answer. Decal sheets are now dried in 2 seconds. Subsequently, the process has been extended to other coatings and materials.

In the drying process, the vapor reacts with pigment oils as coated materials are transported through an enclosed drying chamber on an endless belt.

The drying period depends upon the paint, ink or varnish used and the material which it coats—which may be paper, cloth, metal, wood,

glass, or plastic. After treatment in the chamber, coated materials are dust and tack free, can be handled, stacked, packaged, or given a second coat.

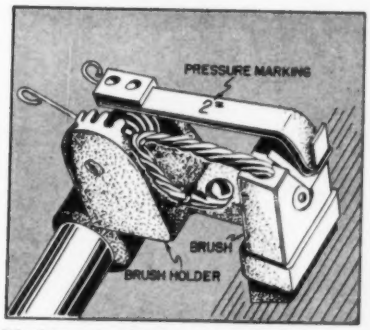
Ultra-Violet Lamp Traces Dust

Contributed by Donald L. Cochrane

IN TRACING a vapor or dust trail through a plant to find its source, an ultra-violet lamp may be used to good advantage. The light emitted will show up the dust or vapor, and show its motion clearly.

In spite of the initial cost of such an innovation, its value can often be measured in employee health, especially in the case of abrasive dust or chemical fumes and fines. The light will be of great aid in finding dust or vapor leaks anywhere in a plant.

Spring Pressure Guide For Motor Brushes



Marking the proper brush spring pressure on one of the brush holders of a motor will speed spring testing routine

How to Store Fully-Charged Wet Batteries

OCCASIONALLY, a quantity of storage batteries cannot be put into immediate use. Such batteries can be stored, fully charged, without damage or deterioration if a simple program outlined by K. A. Vaughan, Manager, Field Engineering, Gould-National Batteries, Inc., is put into effect and followed with regularity.

First, store such batteries in a cool, dry room where temperatures will not fall below 60 F or exceed 90 F. Do not stack the crates, but dispose them on the floor so that cells will be accessible for inspection and charging.

Tops should be removed from the shipping crates, and all excelsior or other packing material should be cleared away from around the tops of the cells. Once this is done, examine the cells for possible damage in shipment such as cracked jars or spillage. If any damage is apparent, have the necessary repairs or replacements made without delay.

At 30-day intervals, take hydrometer readings of several cells; if

THINGS TO LOOK FOR WHEN YOU BUY FLOOR PLATE

LOOK *at the Raised Pattern!*

All steel floor plates have raised figures. Only one—A. W. SUPER-DIAMOND—has the *safety pattern* you see here. Note the over-all pattern of clear-cut diamond treads. It means real foot-safety, first requisite in floor plate.

LOOK *at the Protection!*

SUPER-DIAMOND puts 40 diamond treads in every footstep—40 traction points to keep feet safe and secure. Every SUPER-DIAMOND grips hard for maximum skid-resistance, regardless of the angle of approach.

LOOK *at the Savings!*

First cost is low and so is maintenance—with A. W. SUPER-DIAMOND. The over-all SUPER-DIAMOND pattern permits cutting with minimum waste—provides perfect matching end-to-end or side-by-side. And SUPER-DIAMOND needs no maintenance other than cleaning.

LOOK *at the Service!*

SUPER-DIAMOND installations are permanent. Years of abuse won't wear out this tough, rolled steel floor plate. It withstands hard blows and heavy loads without cracking or breaking. And it's resistant to oil, heat and fire.

LOOK *at the Easy Cleaning!*

SUPER-DIAMOND'S exclusive pattern means no cracks or joints to hold dirt. The surface is easily cleaned with broom, mop or hose—dries fast after washing—can be painted if you so desire

For safety with economy on factory floors, ramps, trench covers, walkways, get full information about A. W. SUPER-DIAMOND Rolled Steel Floor Plate. We'll be glad to send you complete technical data and suggestions for use. Simply clip and mail the handy coupon.

A.W. SUPER-DIAMOND
ROLLED STEEL FLOOR PLATE
ALAN WOOD STEEL COMPANY
CONSHOHOCKEN, PENNA.

Please send me Booklet SD-45 on A. W. SUPER-DIAMOND.

Name . . . . . .
Title . . . . . .
Company . . . . . .
Address . . . . . .
City . . . . . *Zone* . . . . . *State* . . . . . .

Other products: A. W. ALGRIP Abrasive Rolled Steel Floor Plate • Plates • Sheets • Strip (Alloy and Special Grades).

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make light of your heavy loads

handle them
"THRU-THE-AIR"

P&H HEVI-LIFT
HARNISCHFEGER CORP. MILWAUKEE, WIS.

Capacities up to 15 Tons.

How much does materials handling add to your production costs? Along assembly lines? Around machine tools? On loading platforms? In and out of storage? Handling materials is the largest single cost item in most plants. Start licking it now!

Thousands of plants have found the answer to efficient movement of materials with this quick, effortless, low cost way — "thru-the-air" with P&H Hevi-Lift Hoists.

You merely press buttons to whisk loads from one station to another — no strain on skilled hands, no floor congestion, no costly delays. With P&H's full magnetic push-button control, you can also have variable speed where needed.

P&H Hoist Engineers have helped solve hundreds of problems like yours. They can show you how to save money — in the places where most money *can* be saved.

CALL YOUR P&H HOIST DEALER
Or write us for Bulletin H-20.

P&H HOIST DIVISION
HARNISCHFEGER CORPORATION
MILWAUKEE 46, WISCONSIN

the **P&H** *Line*

For more facts circle 545 on Reply Card

(O and P begins on page 50)

any cell is found to read as low as 1.200 specific gravity connect the cells in series (negative to positive) and then to a d-c source of current where a low rate of charge is available. Connect the positive terminal to the positive lead of the charging source and the negative terminal to the negative lead. Charge at the recommended finishing rate as indicated on the name plate or in the manufacturer's instructions until a constant voltage and specific gravity are obtained for four readings taken at hourly intervals and while the batteries are on charge.

In case the available charging equipment does not develop sufficient voltage to charge the entire battery at once, the battery may be split up into smaller units and each unit charged separately.

All specific gravity readings must be corrected for temperature. Correction of these readings for temperature is based on 77 F, with a correction factor of three points of gravity for each 10 F in acid temperature. Using 77 F as a base, add three points of gravity for each 10 F above base, and subtract three points for each 10 F below.

How to Protect Your Wire Rope

Contributed by L. E. Dressler
A. Leschen & Sons Rope Co.

THE BETTER CARE and protection you give wire rope, the better it will serve you. Quality always pays off in a product like wire rope. A high-quality rope naturally possesses high abrasion-resistance, because it is made of finer steel. It also has higher resistance to breaking, either by direct pull or by frequent flexing. There is a difference in "raw" wire, and if imperfect wires are stranded into the rope, the rope quality suffers, and it wears faster.

Normal abrasion can be reduced by frequent lubrication—using a thin coat of adhesive lubricant.

A study of the operation and the layout may suggest other ways to reduce abrasion. Sometimes it is advisable to increase the load (within safe limits) and reduce speed, as a means of lessening abrasive action. If an operator gets into the habit of starting equipment too fast, he might better slow down, in order to reduce "dragging" in the sheaves or blocks.

Blocks and sheaves should always rotate freely. Keep bushings well lubricated, so that lines won't be dragged over sluggish equipment. Soft sheaves or sheaves that are too small will show rope treads, indicating that they are unnecessarily hard on rope. These treads mesh almost perfectly with the strands of the rope that made them but when a new rope is installed it will be entirely out of mesh and the ridges of the treads will become cutting edges with great ability to do damage. This damage will show up first in scratches or cuts. Scratching or scrubbing may also result from poor spooling on drums, which will happen if the rope rolls away from or over the next wrap on the drum. Tight, even spooling, especially on the first layer, reduces wear.

On any line that runs from a drum through a series of sheaves, the portions of the rope that rest on the sheaves and on certain critical points on the drum absorb far greater stresses than the rest of the rope at the moment when the load is fully applied. If the rope returns to its original position for each lift, these parts are bound to wear faster. The solution is to cut off at regular intervals a length of rope sufficient to move these parts from the critical points. Better utilization of the length of the line will result.

Proper wire line anchors which will avoid kinks or sharp bends in dead lines are well worth while. Never pull line around any object having a diameter less than that of proper sheaves recommended for the size line being used.

A common cause of abnormal abrasion is careless handling. Prying the rope, either to move the reel or to move wraps closer together on a drum, should be avoided. Avoid sudden, severe stresses. Many lines on service jobs are abraded by being dragged across rocks or other objects. Sometimes lines are unnecessarily allowed to touch the ground between the storage reel and the rig. Under warm weather conditions when the lubricant may be tacky, the rope picks up sand which acts as a file on the sheaves.

A common condition on operations where wire rope must be kept handy for replacement purposes, is to have reels of rope outdoors—exposed to rain, dust and other elements. When this is necessary a few simple precautions will pay extra dividends. Do not allow the reel to stand directly on the ground or even on a cinder covered area. Mount it on a reel stand or on heavy timbers, otherwise, the weight of the rope may cause the reel flanges to become embedded and the rope to rest on the surface. This practically guarantees rapid corrosion. A temporary make-shift covering of corrugated iron or any similar material that happens to be handy is helpful. So is good lubrication. But there is only one way to be sure that complete protection is provided. That way is to order your rope with a special protective coating that seals the rope completely from air and moisture. When you get a good, factory-applied coating that forms a hardened, protective surface, your problems on this score are answered.

P&H OVERHEAD CRANES
P&H
Electrically Better, Too!
Structural strength? You can take that for granted. But look closely to the electrical equipment. That's the important factor in overhead crane service. That's why P&H builds its own electrical equipment — designed exclusively for crane operation, not adapted for it. Experience is the reason for P&H leadership — experience in building and servicing more than 18,000 electric cranes — far more than any other. You make no mistake when you let P&H build the entire crane — and take the complete responsibility for service.
P&H
Write for Bulletin C-6
P&H MAGNETORQUE ® AC Crane Control provides the finest known speed-load characteristics.
P&H OVERHEAD CRANE DIVISION
HARNISCHFEGER CORPORATION
MILWAUKEE 46, WISCONSIN
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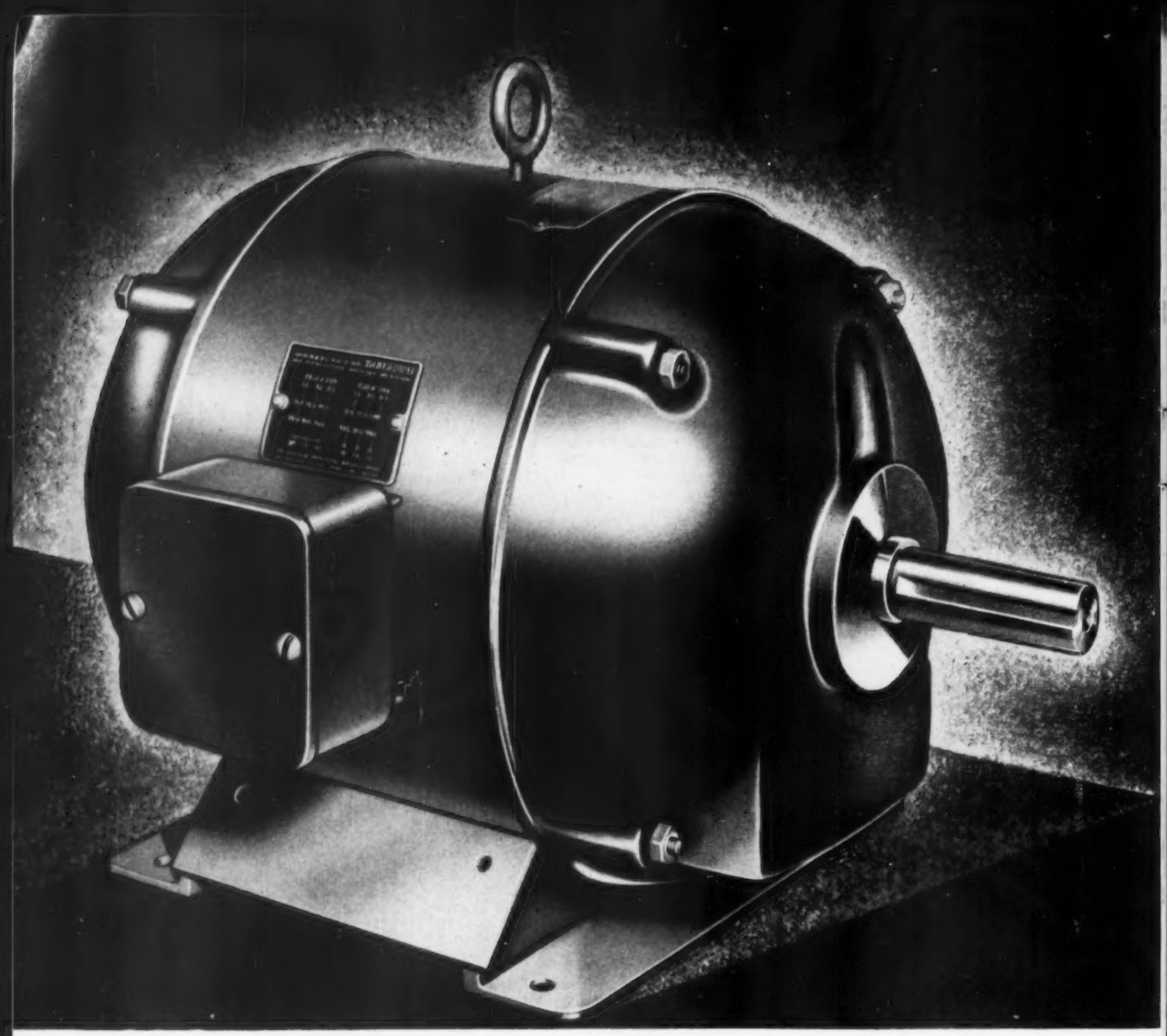
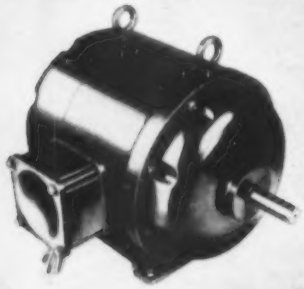


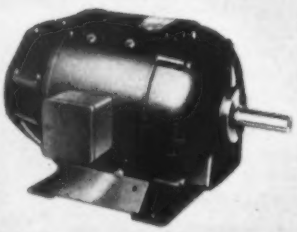
R & M "All-Weather" Polyphase Motors, 1 to 125 h.p.

A COMPLETE LINE - 1 to 125 HP.

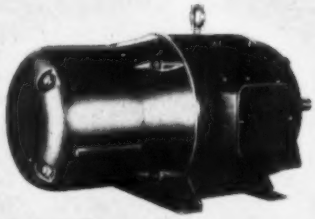
Explosion-Proof, Totally-Enclosed Fan-Cooled, and Chemical Plant Motors, 1 to 40 h.p.



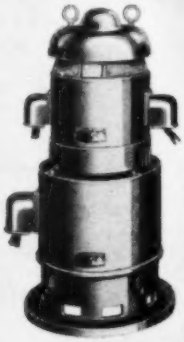
Direct Current, 1 to 7½ h.p.



Capacitor Single Phase, 1 to 7½ h.p.



Frequency Converters, 2½ to 15 K.W.



Because you can forget about periodic maintenance—
and throw away your grease gun—you'll find that

Big, sealed bearings on R&M motors save you trouble and money!

One of the quickest ways to buy a motor you can install —and *forget*—is to be particular about *bearings*. That's why the extra-large, extra-wide, factory-lubricated and sealed bearings in R & M "All-Weather"* Motors are so important.

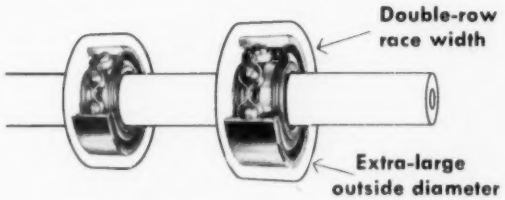
These bearings are much larger than you would normally expect to find. Being larger, they have more and larger balls—withstand more thrust.

And, because they're factory-lubricated and sealed, your grease gun becomes obsolete! That in itself eliminates a good many problems: the danger of introducing dirt and grit into the bearing, under-lubrication, and, equally harmful to motors, *over-lubrication*. Just an inspection once every 5 years or so...that's all that bearings in R & M "All-Weather" Motors need!

Bearings, of course, are only part of the story on the many outstanding features you'll find in R & M "All-Weather" Motors. A few others are shown below. Taken together, they mean *better* motor performance at *lower costs*. If that's the performance you want in your plant or product, use the coupon at right. *It will pay you to get complete information!*

*"*All-Weather" is the trademark of Robbins & Myers, Inc.*

LOOK AT THE DIFFERENCE!



The usual motor bearing and an R & M bearing have been mounted on the same shaft . . . you can SEE the difference!

ROBBINS & MYERS, INC., MOTOR DIVISION PE-23
Springfield 99, Ohio

Please send me, without obligation, complete information on R & M "All-Weather" Motors—up to 125 HP.

*Name*_____ *Title*_____

*Company*_____

*Street*_____

*City and State*_____

*Product we manufacture:*_____

R & M MAKES THEM ALL!

Explosion-Proof; Totally Enclosed; Single Phase; Direct Current;

If it's an **R&M** *it's the Right Motor!*

Motor Generators; Frequency Converters; Chemical Plant Motors; Close-Coupled Pump Motors; Jet Pump Motors; Motor Parts.

ROBBINS & MYERS, INC.

SPRINGFIELD 99, OHIO • BRANTFORD, ONTARIO

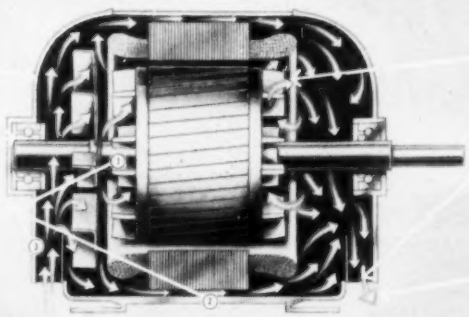
Fractional & Integral h.p. Motors & Generators | Electric Fans | Electric & Hand Hoists & Cranes | Moyno Pumps | Propellair Industrial Ventilating Equipment

ALL THESE FEATURES...at a standard motor price!

Shielded against moisture and damage . . . by heavy, full-height shrouded end-heads.

Extra-large ball bearings . . . Sealed to keep grease in, dirt out.

Completely "Weatherized" . . . rust inhibitor protects rotor (1) against damage; steel parts (2) have baked-on undercoating; cast-iron parts (3) get anti-corrosion treatment. Terminal boxes are gasketed; lead-ins are sealed.



Insulated Coil Ends . . . R & M insulates all *coils*, as well as phase *groups*, for 3 to 4 times greater insulating value!

Sealed against rodents and debris—openings are screened.

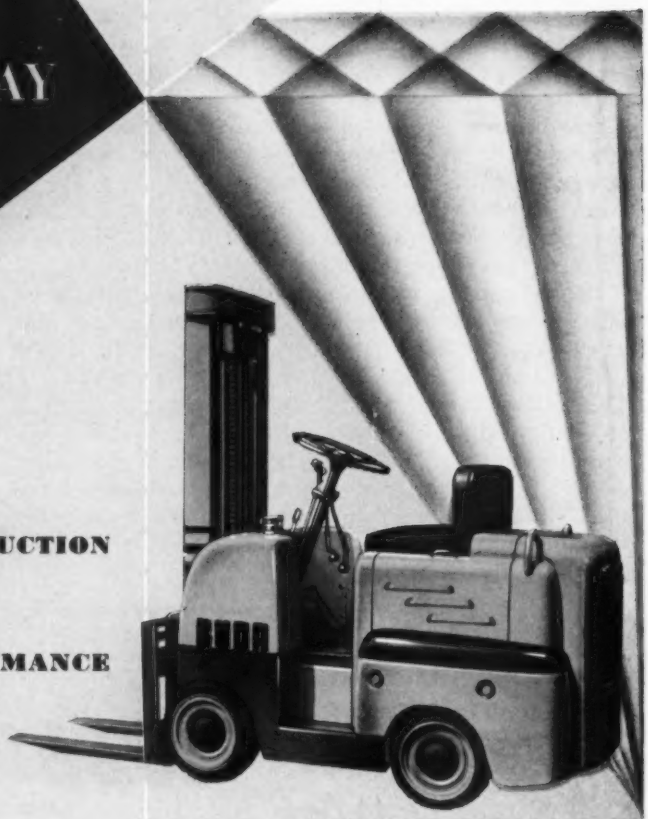
"Clean-Sweep" Ventilation—R & M Motors stay cool and stay clean; arrows show how high velocity air flow stops build-up of dust and dirt.

Finer
IN EVERY WAY

DESIGN

CONSTRUCTION

PERFORMANCE



BUDA
ESTABLISHED 1881

THE LINE WITH ALL 3 FOR DIVERSIFIED HANDLING

DIESEL powered for economy

Once you sit in the driver's seat of a new Buda "FT" Series Fork Truck and put it through its paces—you'll know immediately, that here is *the truck* you've been looking for.

Test it . . . spin it around on a dime . . . feel its stability and quick, powerful response . . . see it pick up, carry and stack maximum loads with superlative ease . . . listen to the quiet power of its Buda Diesel or gasoline engine and see for yourself why material handling men agree that the new Buda "FT" Series trucks are *finer in every way.*

Write for Bulletin 1570.
The Buda Company, Harvey, Illinois

BH-50

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CAL-WIC WIRE CLOTH

meets all special job demands

Whatever your special job demands may be—filtering, screening, grading, cleaning, or any other type of processing—Cal-Wic Wire Cloth is available in the right weave, mesh or weight to give long-lasting dependable service.

Cal-Wic Wire Cloth is precision fabricated in different metals and alloys for resistance to chemical action, corrosion, abrasion and temperature extremes. To order, write or phone our nearest district sales office.

THE COLORADO FUEL AND IRON CORPORATION
Denver, Colorado

THE CALIFORNIA WIRE CLOTH CORPORATION
Oakland, California

WICKWIRE SPENCER STEEL DIVISION
Atlanta • Boston • Buffalo • Chicago • Detroit • New York
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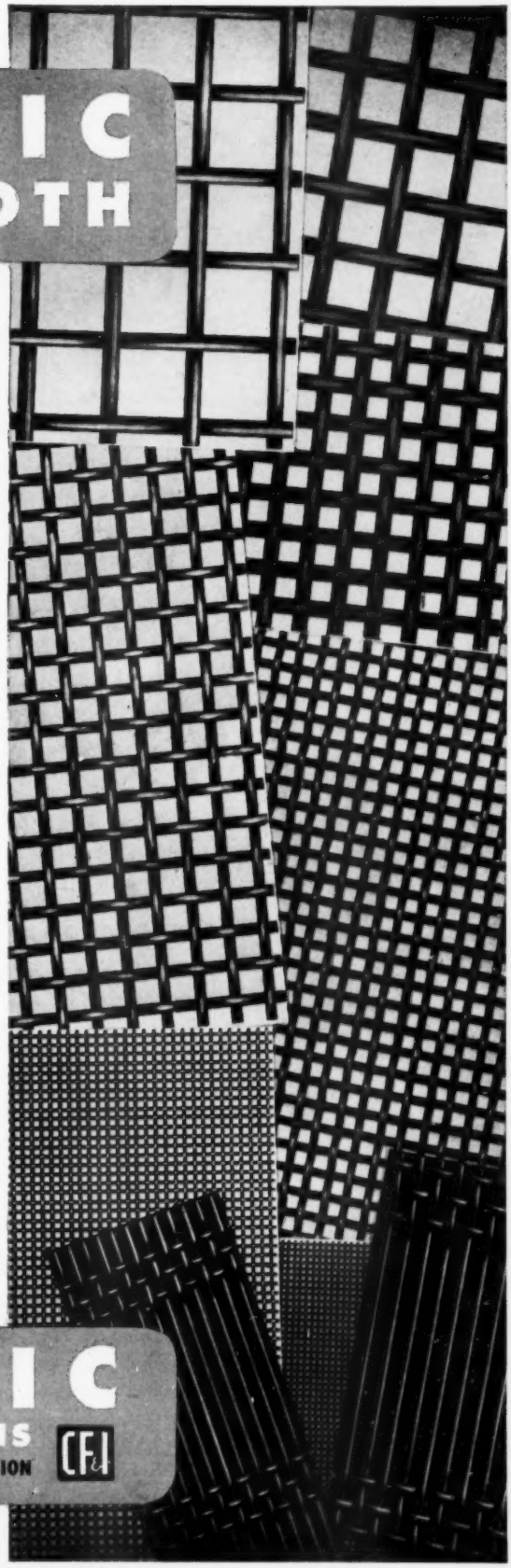

CAL-WIC INDUSTRIAL SCREENS

THE COLORADO FUEL AND IRON CORPORATION CFI

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Don't Bargain-Shop for Service . . .

Bargain shopping for electrical service can be expensive. You'll *lose* . . . if your apparatus isn't repaired properly . . . if the job has to go back to the repair shop. Real savings come only when the work is done right the first time. And this takes special skill—the same kind of engineering know-how that built the original equipment.

You can be *sure* of this craftsmanship at Westinghouse, in its 36 Repair Plants over the country. Each is staffed with experienced workmen who are specialists at rebuilding electrical equipment. They follow standardized procedures on every job. They apply factory-proved techniques and materials. They are backed by exhaustive tests that check out *all* work before the one-year guarantee on rebuilt apparatus is issued. This is the same guarantee carried by new equipment.

Complete service protection, however, calls for more than shop repair. It calls also for precision-built renewal parts, stocked in convenient locations . . . and factory-guided field service to make inspections, adjustments and on-the-spot repairs for equipment that cannot be moved easily.

That's why Westinghouse operates a nationwide network of maintenance services: 36 Repair Plants . . . 31 Renewal Parts Warehouses . . . 46 Field Service Offices.

CALL WESTINGHOUSE FOR A COMPLETE MAINTENANCE SERVICE

Repairs have to be engineered, too!

Combined, these provide a *complete* maintenance service—backed by factory-tested methods, factory-approved materials, factory-trained specialists. They offer the finest in *service protection* . . . the best in *service economy.* Your proof is in the performance of the finished job.

For more information, write today for a free copy of Westinghouse Maintenance booklet, B-4766. It's loaded with facts and illustrations covering the complete Westinghouse Maintenance Service. Send your request to: Maintenance Sales Dept., Westinghouse Electric Corp., East Pittsburgh, Pa. J-95158

...MATCHED TO YOUR NEEDS

YOU CAN BE SURE...IF IT'S

Westinghouse

COMPLETE MAINTENANCE SERVICE

SHOP REPAIR FIELD SERVICE

GENUINE RENEWAL PARTS

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Designed specifically for commercial and industrial use . . . built ruggedly for long-life . . . Duro-Test lamps cut lighting costs . . . increase lighting efficiency.

For better light, longer life, fewer replacements, and lower maintenance costs write today for complete information.

DURO-TEST CORPORATION

North Bergen, New Jersey

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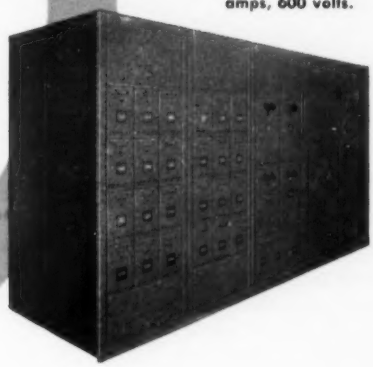
for maximum Service . . .

INSTALL FA

FA SHUTLBRAK
30 to 1200 amps, 250 volts AC or DC and 600 volts AC.

FA CIRCUIT BREAKER
15 to 600 amps, 250 volts AC or DC and 600 volts AC. For larger capacities, Air Circuit Breakers are used.

FA KLAMPSWITCHFUZ
30 to 600 amps, 250 volts AC or DC. SNUFARC, 30 to 200 amps, 600 volts.



STANDARDIZED SWITCHBOARDS

STANDARDIZED FA SWITCHBOARDS are noted for their efficiency, safety, and dependability.

Built of standardized pre-assembled units, incorporated in standardized enclosures, these sturdy, long-lasting and trouble-free power centers embody the latest features of design and operation.

Standardized FA Switchboards are of three types — the **Shutlbrak,** a safety type switchboard designed for frequent operating use; the **Klampswitchfuz and Snufarc,** which features a dependable hinged type, pull-out switch unit for disconnect service on lighting and power circuits, and the **Circuit Breaker,** another safety type, featuring the latest developments in automatic circuit protection.

All Standardized FA Switchboards are factory assembled and shipped ready for connection to main and branch circuit cables. Units can be arranged singly or grouped because all sections fit readily together. Removable end walls permit the addition of sections on either side.

Want to know more about these efficient, long-lasting power centers? Your nearest FA representative listed in Sweet's will be glad to give you complete information.

Frank Adam Electric Co.

P. O. BOX 357 ST. LOUIS 3, MISSOURI

Our 61st Year

Makers of BUSDUCT • PANELBOARDS • SWITCHBOARDS • SERVICE EQUIPMENT • SAFETY SWITCHES • LOAD CENTERS • QUIKHETER

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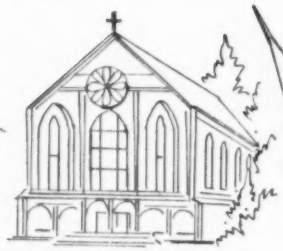
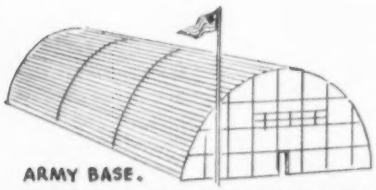
NOTES FROM AN ENGINEER'S SKETCH PAD

LOOKS LIKE THAT VERSATILE DRAVO "COUNTERFLO" HEATER CAN BE USED ON PRACTICALLY ALL OUR JOBS.

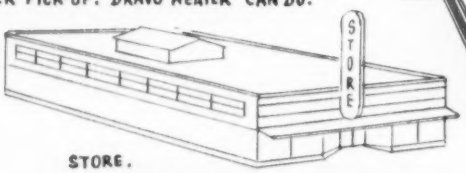
SCHOOL. DISTRICT BUDGET LIMITED. CAN SAVE WITH DRAVO HEATERS.



CHURCH. INTERMITTENT HEATING. NEEDS QUICK PICK-UP. DRAVO HEATER CAN DO.

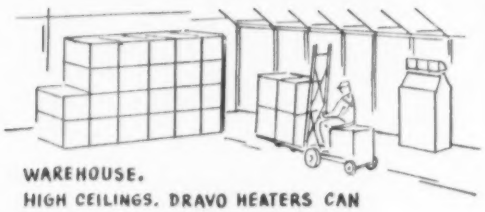


ARMY BASE.
WINTER CONSTRUCTION ON THESE BARRACKS. CAN INSTALL DRAVO HEATERS EARLY FOR HEAT DURING CONSTRUCTION AND AFTER COMPLETION.

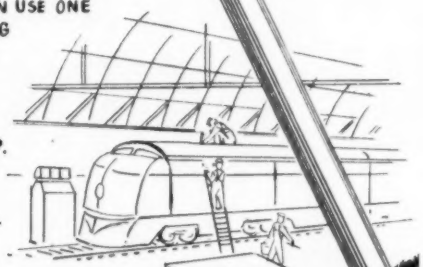


STORE.
WITH DRAVO HEATERS, CAN USE ONE SET OF DUCTS FOR HEATING AND AIR-CONDITIONING.

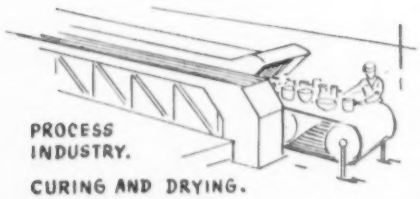
INDUSTRIAL PLANT.
DRAVO HEATERS HAVE 150' AIR THROW. NO DUCTS NEEDED.



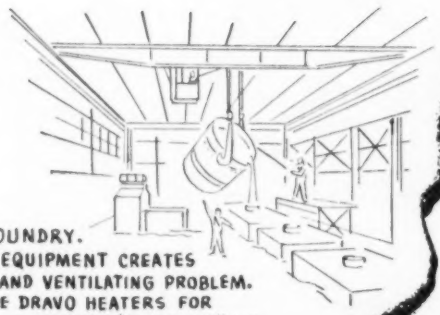
WAREHOUSE.
HIGH CEILINGS. DRAVO HEATERS CAN REDUCE ROOF HEAT LOSS, KEEP HEAT WHERE IT'S NEEDED.



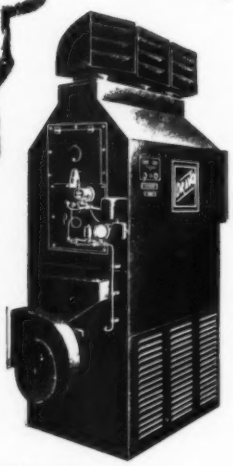
DIESEL RAILROAD SHOP.
NEEDS HEAT AT WORKING LEVEL. DRAVO HEATERS IDEAL.



PROCESS INDUSTRY.
CURING AND DRYING. SPECIFY DRAVO HERE.



FOUNDRY.
EXHAUST EQUIPMENT CREATES HEATING AND VENTILATING PROBLEM. USE DRAVO HEATERS FOR TEMPERED "MAKE-UP" AIR.



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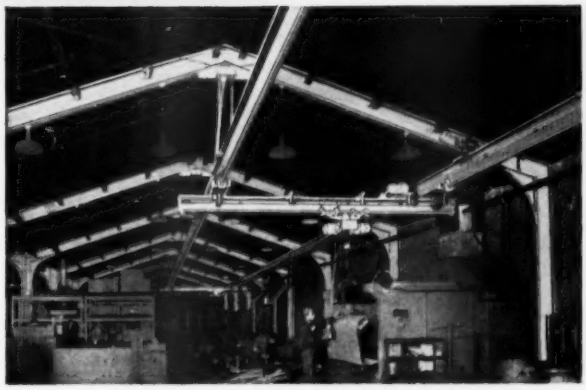
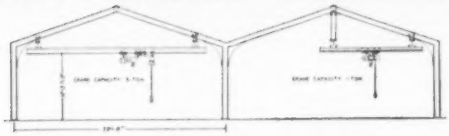
For more facts circle 553 on Reply Card

Photos courtesy of The Thew Shovel Co., Lorain, Ohio.

Rigid frame structure by The Steelcraft Mfg. Co., Rossmoyne, Ohio.



AMERICAN MONORAIL EQUIPS RIGID FRAME BUILDINGS



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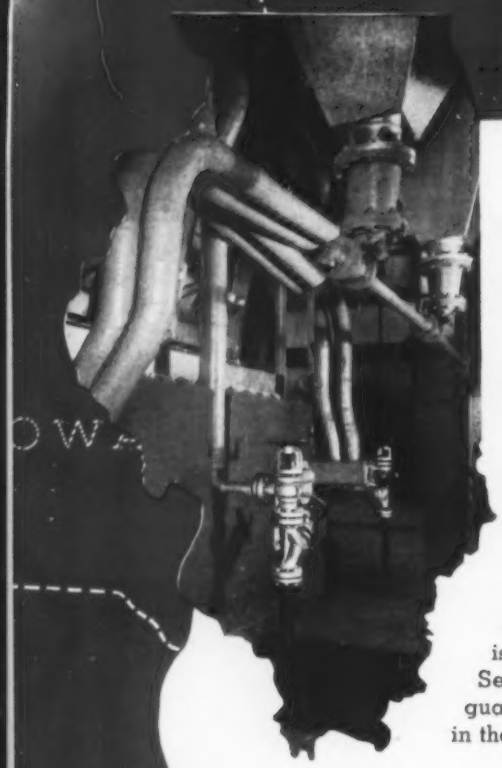

INTERNATIONAL HARVESTER PICKS

YARWAY

SEATLESS TANDEM BLOW-OFF VALVES

International Harvester Company's great McCormick Works at Chicago is another long-time user of Yarway Seatless Blow-Off Valves. Yarways guard each of the four large boilers in the plant.

Good boilers are better boilers with Yarway Blow-Off Valves. Good design, careful engineering and manufacturing, modern metallurgy, dependable service—all combine to make Yarways the standard blow-off valves in more than 15,000 plants.

Yarway engineers, conveniently located near you, are constantly working for better, more profitable steam plant operation. Call a Yarway man for help on your problems.

Yarway Seatless Blow-Off Valve features balanced sliding plunger. *There is no seat to score, wear, clog or leak.* Write for Bulletin B-425 for pressures to 400 psi.; Bulletin B-433 for higher pressures.

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YARWAY SERVICE GOES ALL THE WAY...

4th National Plant Maintenance Conference · Show

1953

There is no philosopher's egg, no magic formula, for the solution of maintenance headaches. Like the poor, they are always with us. Nothing in industry is able to move—a wheel on a shaft or a shoe on a floor—without initiating a job for the maintenance department. Nevertheless, one of the most hopeful signs yet to appear has been management's unqualified recognition of maintenance as a legitimate child of industry. It is no longer pushed into a back-room closet with the hope that it will disappear; something is being done for it. Preventive maintenance programs, well conceived and intelligently operated, are proving that maintenance can be employed as a production tool. Indeed, one speaker at the Conference carried this thought to its logical conclusion. The ever-increasing speed with which the "automatized" plant is approaching is bringing about the day when the maintenance force will "double in brass" as operating and production crew—the only men in the plant.

In this section the editors have tried to capture this feeling, exhibited so strongly at the Conference and Show. Pertinent quotes from speakers are presented. And there are photos, too. We hope you like the report.

PMS 1953

Plant Engineer Jack Starnes of Faultless Caster Corp. expands on some of his problems to Fred H. Doerr, district sales, F. G. Doerr, sales, and Russ H. Nutter, Detroit mgr, also of Faultless Caster Corp.

A. J. Woods, sales engineer, Dow Corning Corp., showing R. S. Weinberg, Associated Steel Co., and unidentified visitor, silicone uses with G. Webster's aid

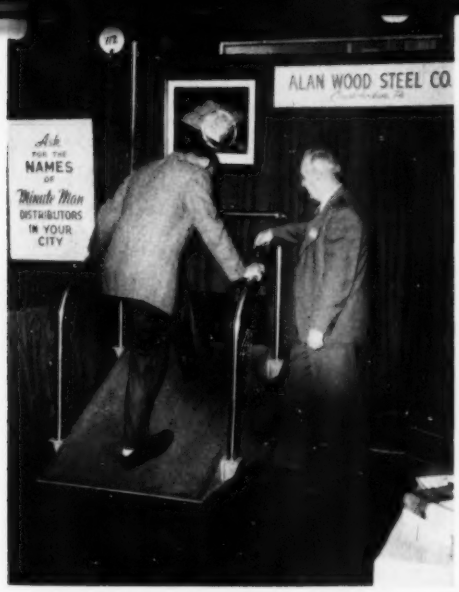
C. F. Walters, ch. elec., and J. B. Bell, asst. m. m., McWane Cast Iron Pipe Co., listen to S. L. Allen, sales, J. E. Rhoads & Sons

E. C. Hesli, general sales mgr, Multi-Clean Products, Inc., discusses literature with C. C. Ellingwood of Delco-Remy Div GM

E. R. Wilkinson and J. H. Bannon of the Esso Standard Oil Co. with Dr. R. A. Kurtz, Rubber Chemicals Div., and R. M. Turner, of E. I. du Pont de Nemours Co.

C. F. Kirkpatrick, Chicago assistant manager, R. E. Morrison, Detroit sales, and P. N. Wheeler, Unisorb Division manager, all of the Felters Company, examine the large photo montage of their equipment which was displayed in their booth at the 4th Plant Maintenance Show

J. L. Feuchter, service engineer, Federal Bearing Co., Inc., gets some information from Phil Nichols, Industrial Products Div. manager, Detroit Steel Products Co.



Plant engineer W. D. Cox, Temco, Inc., tries out ramp at Alan Wood Steel Co. booth, while E. Stewart Riggs, Alan Wood's dist sales rep, discusses ramp's merits

Elmer Diebold and M. S. Rolston, Black & Decker Mfg. Co., with B. Earnheart, Monsanto Chemical

R. C. Gerow, asst. sales mgr., Gates Engineering Co., and D. V. Romig, Avco Manufacturing Co.

Paul L. Crispin (background), plant superintendent, Titan Metal Manufacturing Co., collecting helpful information from H. D. Noll, sales, The Eagle-Picher Sales Company, on the care of industrial floors

Bill Dyke (foreground), distributor sales mgr, Blackhawk Manufacturing Company, converses with F. C. Hurley of Bethlehem Steel Corp. (Sparrow's Point)

Harry C. Hicks, Jr. (center), foreman, Nickel Plate Railroad, receiving educational facts from sales engineers, Ciet Tepas, R. Lawson at Miller Motor booth

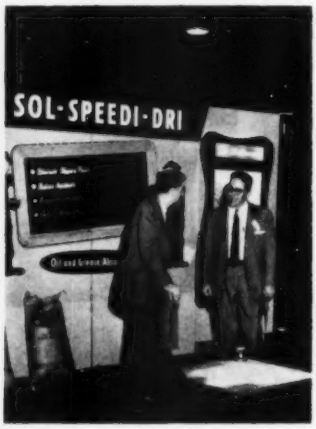
Don Vance (left center), vice president of the Korfund Company, Inc., points out interesting literature to T. C. English and W. T. Wonnacott, both Cleveland representatives, and N. Creash, sales, in the Korfund Company's display booth at the 4th Plant Maintenance Show. This exhibit was just one of several hundred very colorful displays at show

T. H. McWilliams, maintenance supt., Shenango-Penn Mold, inspects color chart with H. McElroy, American Olean Tile Co.

J. O. Eadie, maintenance foreman, and George C. Gabel, Syracuse Service Div. manager, both of General Electric Co., visit N. Harper, asst. sales manager, Paint & Emulsion Department, and A. H. Brown, sales, of the Philip Carey Mfg. Co.

D. H. Vanvleck, Ind sales div. mgr, Cuno Engineering Corp., F. J. Ursem, sales rep, F & W Ursem Co., J. E. Duff, Cuno's sales prom mgr, discuss strainers

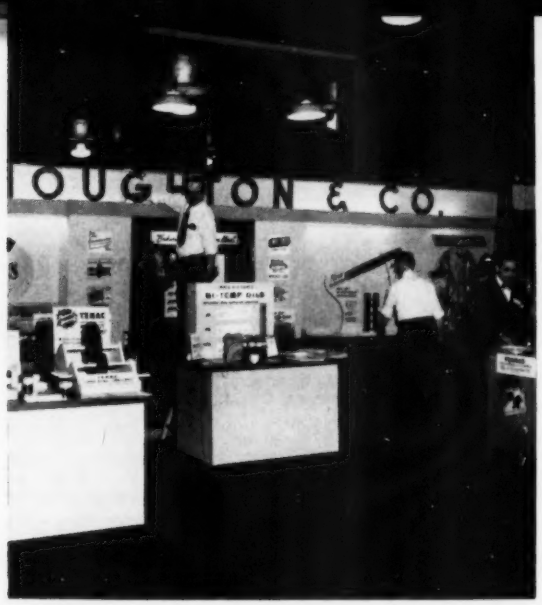
J. W. Fisher, Dearborn Chemical Co., talks with E. G. Kihlstrom, asst. sales mgr., L. W. Behrendt, sales mgr., American Pullmax Co.



L. M. Mank, sales, Speedi-Dri Corporation, converses with O. R. Menton, assistant mechanical engineer of Esso Standard Oil Co.

F. S. Liechti, prod mgr, Chain Hoist Div, and H. F. Morse, prod mgr, Budgit Electric Hoist Div. of Manning, Maxwell & Moore, Inc., and W. C. Doody, of the sales div, Mechanical Equipment Co., Inc.

Peter S. Griggs, sales, and Walter Brezina, sales representative, Bassick Company, proudly display one of the company's casters—another example of construction refinements seen at the Maintenance Show



Douglas Miner, advertising mgr, E. F. Houghton Co., and J. T. Elliott, Hcughton lubrication engineer, get booth in order. C. L. Petch, pres, Petch Mfg. Co., dropped in to help

William Cubberly (center) sales engineer, Henderson-Hazel Corp., getting information on Unistrut's metal framing from Ed Nickel (right), sales manager, Unistrut Products Company

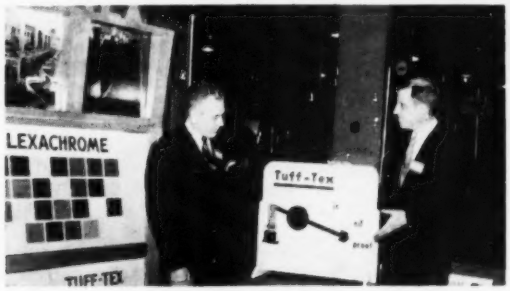
H. W. Elkins, Cleveland branch manager, Owens-Corning Fiberglas Corp., looks on as R. C. Lawrence, plant engineer, W. C. Hardesty Co., Inc., gets filter facts from R. W. Fenwick, Fiberglas sales engineer

W. J. Peckham, sales, Upson Walton Co., and W. F. Berlo, sales engineer, Dayton Rubber Co., talk v-belts at Dayton Rubber's booth

Ralph Bellamy, Buchanan Electrical Products Corp., explains a point to J. O. Eadie and George Gabel, both of General Electric

Sales mgrs J. M. Taylor, E. L. Love; C. H. Judisch, pl. engr; H. L. Gobeille, Whitney-Blake Koiled Kords.

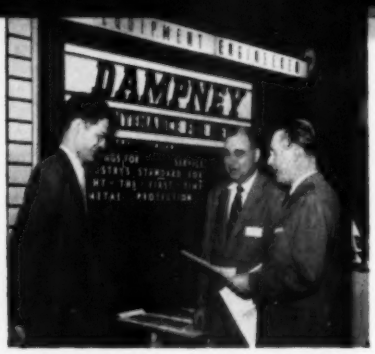
C. M. McNally, Jr., district rep., and R. C. Slattery, asst. sales mgr., of the Tile-Tex Division of the Flintkote Co.



John O'Neill, maintenance engineer, Chicago-Latrobe, looks on while Paul Enger, sales, Tri-Boro Steel Supply Company and Harry P. Barth, district representative, Rust-Oleum Corporation, demonstrate how paint rollers are used to apply coating to wire fence

E. S. Boyer, sales manager, with R. F. Protiva, J. P. Ashburn, Pete Ruos and Norman James, all of the Flexrock Co.

Ed Gearhart and R. R. Burich, radio communication engrs. of Motorola, Inc., talk to Kriss Lasmansis (center) G.E.



J. Coffin, director, and A. R. Gabel, asst director, Paint Mtce Lab, Dow Chemical Co., J. Bird, The Dampney Co.

G. W. Rolling and J. P. Adams, of Benning Auto Parts, Inc., listen to L. C. Plageman (center) of Equipto

H. F. Heidenreich, plant engineer, General Electric Co., Alkyd Resin Plant, fills in his registration card at Show

J. B. Morse, plant engineer, General Electric Co., talks with E. F. Todd, advertising mgr., Imperial Brass Mfg. Co.

PMS 1953

MAINTENANCE OPERATING POLICIES

By D. F. STANFILL, JR., Assistant Superintendent, Construction, Maintenance, Lockport Works, The Texas Company

IT HAS long been the policy of The Texas Co. to periodically shut down all operating stilling equipment for inspection and test, regardless of how well the equipment is operating or how urgently the products are needed to meet requirements or commitments. Most stilling equipment is shut down at approximate six-month intervals, or twice within a twelve-month period.

In very few cases is it permissible to operate for periods in excess of six calendar months, regardless of intervening idle time during these periods. A very few operating stilling units are run as much as a year, but these are usually low pressure or low temperature units where experience has shown that corrosion rates are quite low and many previous inspections have proven that this can safely be done.

When the equipment is brought down, hydrocarbon lines supplying the unit during normal operations, including fuel gas lines, are promptly blinded to prevent any possible flow of such products to any part of the unit. The unit vessels, heaters, lines, etc., are then evacuated, pumped, blown and/or steamed free of hydrocarbon liquids and gases, and additional blinds are installed between lines, vessels, etc.

All vessels, heaters, lines, are then opened up or broken apart, further cleaned of deposits and scales, after which interiors and exteriors are visually inspected. This preliminary visual inspection is principally to ascertain what future cleaning is required, and to make an over-all quick determination of the indicated extent of repairs that may be required, internal scaffolds needed, etc.

After further cleaning, scraping and sandblasting, highly skilled inspectors then make detailed visual inspection of all component parts of the unit, determine metal thickness of lines and vessels, and establish metal losses, if any, since the previous inspection, inspect welds, rivet joints, etc., thereby definitely establishing repairs and replacements required because of metal loss, defects, weaknesses and malcondition. Certain repairs and replacements are obvious without detailed inspections, and craftsmen work on such items while the detailed inspections are carried out. Many repair, replacement, or cleaning items are repetitive, and these are carried along without having to await inspections and decisions by inspectors and technicians.

During the inspection and test periods, pumps are dismantled, measured and/or calipered, repairs or replacements made, the equipment reassembled, and usually tried out for working condition. With variations in accordance with the nature of equipment involved, the same general comments apply to electric motors, starters, transformers and solenoids, and to compressors, gas and steam engines, turbines, gear reducers, valves, control equipment, and to practically all moving components of the unit.

The purpose of an inspection and test is first to determine the conditions of all parts of the equipment of operating stilling units; second,

T. E. Hanson, Plant Engineering Magazine, with R. W. Ebey, adv. mgr., and Arnold Lane, service engr., Aeroquip

Charles Walter, plant engineer, Parts & Equipment Mfg. Div., of the Ford Motor Co., registers at the Show

Floor maintenance machines and commercial vacuum cleaners displayed in booth of the Breuer Electric Mfg. Co.

R. J. Neu, sales development, of Rohm & Haas Company admires Plexiglas protective windows displayed in booth

W. Sonderman, field engineer, Magnaflux Corp., shows defective equipment to J. P. Adams, Benning Auto Parts, Inc.

Reed Weyburn, dist sales rep, W. L. Guiles, mgr technical sales and A. H. Loux, mgr dist sales, Flexible Tubing

to determine what repairs or replacements are needed to effect these repairs or replacements; and third, to reassemble all component parts and to test them in various ways to establish that they are in safe and sound condition for continued operations over an established period of time.

It is recognized that these practices and procedures are expensive and time consuming. But my company feels and knows that the policies pay, and they have proved it over and over during the past fifty years. We are as cost conscious as other big corporations. We examine our maintenance problems almost constantly, and do not continue practices merely because they were once set up some time in the past. Many qualified people establish these policies, after careful consideration of all facts as they are developed, year by year, or even day by day, and once the decisions are made and the policies are established, they are followed by all concerned. The basic and number one policy is to do whatever is necessary to operate safely.

It is our practice to do practically all maintenance work with our own forces. This includes fabricating pipe work and relatively simple machined parts, mostly for repairs and replacements. We have shops for all crafts, but these shops are designed and equipped to do repair work predominately. We have found it more economical to purchase spare machine parts, fabricated structural and tank steel, and all castings and forgings.

We carry a substantial warehouse stock of pipe, tubing and fittings, most of which are subsequently used in maintenance fabrication by our own craftsmen. We seldom manufacture anything that we can buy, except fabricated piping. About the only repair work that is done outside the plant is heavy automotive repairs and electric motor rewinding and baking.

Major Construction Projects

Major construction projects are usually handled by outside contractors, since we normally operate with minor variations in labor forces. Plant forces frequently handle the smaller construction projects, and larger ones where the work ties in to stilling equipment, or in congested areas where safety requirements dictate the use of refinery trained craftsmen. Keeping operating equipment on the line or minimizing down time occupies about 70 per cent of the maintenance force.

The balance of the force is divided between small construction—10 per cent, non-operating equipment maintenance—10 per cent, and services—10 per cent. These percentages vary from week to week or even day to day. Keeping operating equipment on the line or restoring down units back to service naturally comes first, since our primary function is to refine or process oil. There are times, however, when as much as 50 per cent of the force can be put on non-operating equipment maintenance, rehabilitation, construction, clean-up, and similar jobs.

Working in the above manner requires careful budgeting, planning, scheduling, and estimating to cover time, men, and materials.

Inspection and test requirements come first in budgeting and planning, followed by expected down periods for clean-up of fouled or coked units. These latter do not, of course, occur with any fixed regularity, but over the course of a year we can approximate closely the total number of maintenance men that will be required for this work. Routine maintenance forces can be determined with considerable accuracy, especially those that cover the fixed services and the round-the-clock shift electricians, instrument men, machinists and pipefitters. The forces include manpower allowed for small construction and miscellaneous maintenance, and these also are carefully budgeted.

We operate very closely to the yearly budget, but day by day we have wide variations, with lesser variations month by month. Yearly budgets are compiled by the refineries each six months, and monthly

R. Trowbridge, plant engineer, Barcalo Manufacturing Co., listening to Harry Williamson, sales, G. H. Tennant Co.

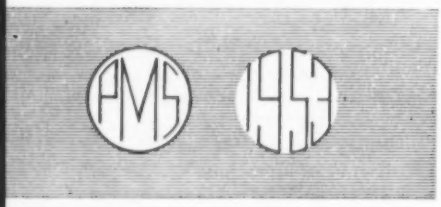
C. M. Watt of Canadian General Electric inspects 5-in. drill held by Denison Groves, sales mgr., Tilden Tool Mfg. Co.

C. E. Fuller, sales promotion engr, Binks Mfg. Co.; A. T. Harris, ch engr, and H. Rakatansky, engr, Imperial Knife

P. B. Beemsterboer and M. M. Talmage of Frigidaire Div., GMC, with J. Eveckovich, H. Lake, Cleveland Clinic

C. K. Binkley, plant engineering manager, New Holland Machine Div., Sperry Corp., walks into Maintenance Show

T. Z. Van Raalte, advertising mgr., and C. Rogosch, asst. district mgr., of the West Disinfecting Co. at their booth



budgets are made each month for the next month, all of which are controlled by top central management. In addition, weekly forecasts for all maintenance forces are prepared for approval of local management, these being only slightly modified day by day to meet varying conditions as they occur.

Accurate cost controls are maintained by coding or symbolizing all operating units individually, all divisions or departments, offices, materials warehouse, shops, etc. and charging to them day by day all labor, materials, supplies and utilities. Most of this is done through tabulating key-punch cards and conventional business machines. Accurate cost records are made available to individual heads of departments each month, these being broken down into whatever detail is felt to be desirable for full information and for controls of costs. These cost records also serve as a guide in preparing departmental budgets.

Standard practice sheets are not used directly in carrying on regular maintenance work, but are used extensively for craft training. Check sheets are used for daily, weekly, and/or monthly routine inspections of machinery, motors, compressors, and other equipment. All "must" items on inspection and test work on processing equipment are outlined in writing in detail prior to each inspection and test, and records of compliance with these mandatory items are maintained by requiring authorized and qualified persons to sign or initial each item as being satisfactorily completed.

Maintenance department is usually consulted in the selection of production equipment, particularly as to ease of access to internals, simplicity of parts, acceptability to the maintenance department, and for past experiences. This is usually carried out at the supervisory level, but when in doubt, supervisors frequently consult with their better skilled mechanics for detail recommendations. It is common practice in our company when going to something different from previously proven and accepted equipment to consult with maintenance on problems such as the above, and take into consideration maintenance's viewpoints in the matter. Design requirements must, of course, govern, but it frequently occurs that maintenance's experience will determine which of several seemingly equal pieces of equipment will be purchased, even to the extent of reasonable price differentials.

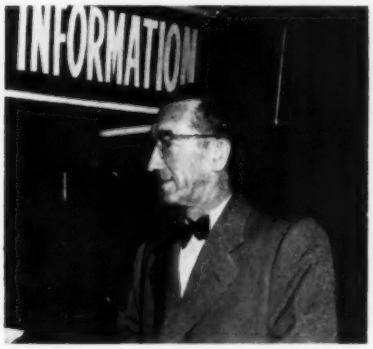
Maintenance has a definite voice in shutting down production equipment for upkeep, but this is usually done through consultation with production or operations. Shift mechanics are on duty on all shifts seven days per week. One of their important functions is to inspect equipment. Another is to arrange to take out of service any equipment that can be shut down without adversely affecting our operations or bringing to attention of plant management the need for upkeep shutdown.

Responsibility for instrumentation, its purpose, function and maintenance is largely carried out by qualified technicians, usually specialists in the three principal branches of engineering services: power, process, and general engineering. Each plant is staffed with an instrument department, consisting of a foreman and highly skilled instrument men who install and maintain control instruments, and occasionally arrange for new or improved usages and applications. New ideas, applications and usages come from production, maintenance and various technical employees, all of whom cooperate closely. Instrumentation is very extensive in our business and is growing by leaps and bounds. As an example, 5 per cent of the total maintenance force in our Lockport refinery are instrument men, and two men are on duty 24 hours per day, seven days per week, on

Don Graveman of Champion Mfg. Co. explains features of saw and blades to Frank Ambrogio, mtce supt., Ladish Co.

H. E. Carlson (right center) with J. R. Perkins, R. B. Edgar and J. F. Howe of Delco Products Division of the GMC

V. G. Mulligan, sales mgr, Ideal Industries, Inc; E. Switzer, pl engr, Shuron Optical; J. LeDuke, Dow Chemical



James Peters, plant engineering dept, Ford Motor Co., Dearborn, Michigan, inquires about conference proceedings

D. S. McCullough, sales manager, and G. W. Gifford, sales engineer, of the Versa-Mil Co., demonstrate equipment

Glenn Case, pres., Material Handling Equipment Corp., a Clark Equipment Co. jobber, A. Gressel, Research Oil

trouble shooting and preventive maintenance combined.

Returning to our practices and policies on preventive maintenance, we maintain a skeleton crew around the clock, 365 days per year. This crew in our Lockport refinery consists of three shifts per day of one general maintenance foreman, two instrument men, one electrician, two machinists, one pipefitter and one pipefitter helper, and a truck driver who devotes about 40 per cent of his time to sample pick-ups and 60 per cent to maintenance and errands.

All of these men are combination trouble shooters and preventive maintenance men. All are charged with the responsibilities of checking and inspecting operating equipment, particularly watching and checking any equipment that shows signs of malperformance, overheating, vibrating, etc. All shifts perform certain of these duties, but the bulk of the routine inspection work is done Monday through Friday, dayshift, during which period the bulk of the maintenance forces and the supervisors are available to handle trouble shooting.

Each of these shift crafts has a whistle signal so that they can be contacted from any point in the plant. Normally this is done through the shift foremen, either maintenance or operating, but any employee in the plant can have the whistle blown in case of emergency or urgency which prevents handling it through supervisory channels. When it is considered necessary to contact the shift craftsmen, the person desiring their services telephones the operator of the whistle station (usually a pumper in a pump house) and asks that the whistle be blown for the concerned shift foreman (or shift craftsman, if emergency). The person being called goes to the nearest telephone and calls the whistle station to determine what is wanted or who to call for more complete information. He then follows through with whatever action is necessary to handle the situation.

Most of our maintenance work, other than the above, is carried out on the regular day shift, Monday through Friday. Certain continuity or "bottle-neck" work is carried out on the two night shifts, where it can be established that such work is necessary to minimize down time. If two shifts per day will get the job done in time, it is customary to work the day and evening shifts rather than to spread out to the third or early morning shift.

It is our normal practice to sched-

F. J. Dahleiden, Cleveland district manager; K. R. Dodge, Cleveland sales engineer; and R. S. Hayes, advertising manager, all of The Okonite Company, check on a few points before the engineers begin flocking in to view the exhibits

L. J. Bouchard, sales engineer, and Kenneth D. Reed, Mill Lubricating Division manager, De Laval Separator

G. W. Williams, Product Engineering Dept. mgr., Neville Co., talks with A. G. Neumayer, district mgr., Honan-Crane

R. H. Folckemer; W. E. Belt, sales mgr, The Protectoseal Co.; H. N. Baum, MGR Agency; J. Roberts, B. F. Goodrich Co.

Al Keyes, asst. mgr. Order Dept., and George Alexander, div. sales mgr., of Van Cleef Bros., Inc., Mrs. Ohio, 1951

D. D. Foster, district manager, and V. M. Barber, advertising manager, of Hills-McCanna Company, discuss Show

A. G. Lane, field representative, and Charles J. Turner, advertising division, Remington Arms Co., Inc., view display

PMS 1953

MAINTENANCE ORGANIZATION

BASED on past practice, the maintenance organization of many plants was represented by one top man, who might be an engineer. Other supervisory levels were held by men from the ranks. There was no staff of specialists. Repairs were made as they were needed. In addition, there was a strong central type of organization, mostly crafts. Work was done as requested from the operating areas. Maintenance personnel were not always too familiar with how the process equipment operated. This, in many cases, resulted in work being done more than one time. After each job was completed the maintenance personnel returned to their central station.

This resulted in: (1) frequent repairs to the same equipment; (2) little preventive maintenance practice; (3) loss of time in walking back and forth; (4) loss of equipment down time; and (5) no method improvement.

With better knowledge of process equipment came the necessity for cooperation with the operating personnel and the use of better maintenance control. The Area Group was not only enlarged, but both Area Foremen and Area Engineers entered the picture.

With the advent of the engineer in lower levels of supervision, with more engineered maintenance, job improvement, inspection and overhaul schedules, repair order and backlog control, many other factors entered the maintenance picture, and Engineering Maintenance was on its way.

Then came the era of better tools and the adoption of planning and production methods to maintenance work wherever possible. With the application of both daily scheduling and weekly forecasting the old organization was ready for the scrap can.

All of this had its effect on the kind of organization. It was necessary that technically-trained personnel establish and apply these new techniques, that authority be subdivided, and that the plant be divided into maintenance areas, based on operating conditions, for a better understanding and execution of maintenance work.

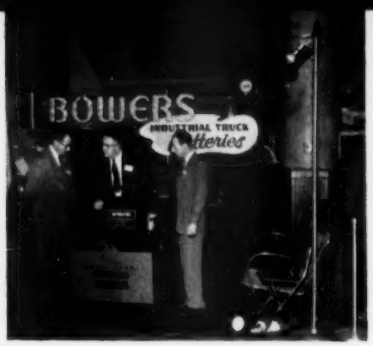
The results were that the Works Engineer, his Assistant and the Power, Maintenance, Area, and Service Engineers—had to have technical educations or their equivalent. With techni-

ule such maintenance forces in weekly periods. So, in order to avoid unnecessary night forces, they are usually held to bare minimums to get the job done. If it becomes necessary to supplement the night forces during the week, such arrangements are made. Night work usually runs less than 10 per cent of total forces, and averages much less.

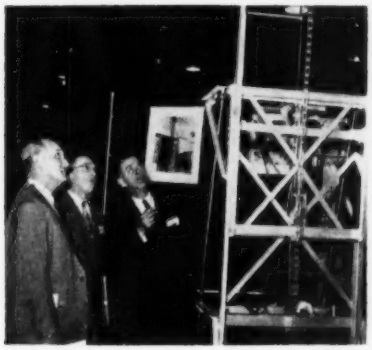
The generation and distribution of electricity and steam as well as all water pumping is an operating function, and maintenance has no direct responsibility except to inspect and check moving equipment while in operation. All maintenance work, when required, is performed by plant forces. Again, as in the case of stilling equipment, boilers and appurtenances, including water treating equipment, are inspected and tested at regular intervals, usually once per year. Certain portions of the transforming and electrical distribution systems are visually inspected daily, and transformer stations, relays, and similar equipment are cleaned, inspected, tested and oil changed once per year, minimum.

C. J. Egger, asst regional sales mgr, and W. M. Cage, sales engr, of Bowser, Inc., make last-minute check of booth

H. R. Hartman, chief engr, P. W. Dwyer, pl engr, Witco Chemical Co., in front of portion of large Westinghouse exhibit



P. J. Maudru, Seiberling Rubber Co., with R. M. Jaccard, Ind. Div mgr., J. Peterman, Bowers Battery & Spark Plug



B. A. Caler, mtce engr., L. G. Atkinson, pl engr, Westinghouse; E. W. McDonnell, pres, Economy Engineering

Big Joe Koehler (about 7 ft, 6 in.) standing next to Jack Kiefus, president, Big Joe Manufacturing Company

W. B. Crane, sales rep; P. M. Fallon, advertising mgr; and L. Nellenger, contact man, in front of company booth

By **HENRY W. SHOCKLEY**, Maintenance Consultant, Engineering Department, E. I. DuPont de Nemours & Co., Inc., Wilmington, Del.

cal education as a basis for selection, we list a few engineering assignments of a Works Engineering organization and describe their duties and responsibilities.

1. **The Power Engineer or Supervisor**

Primary Function: To administer the production and distribution of utilities.

Duties and Responsibilities: 1. Responsible for the proper organization and functioning of the Power Division.

2. Through informative data determine power operating efficiencies. Take necessary corrective measures where results are below standards.

3. Control the distribution of both operating and maintenance wage roll personnel.

4. Through reports, contacts with supervisory personnel and others, guide and make necessary corrections in conjunction with: a. Inventory control of essential materials, supplies and spare parts. b. Distribution of utilities. c. Forecasts of major repairs. d. Control of waste.

5. Assist in the formulation and application of training programs, both supervisory and wage roll.

6. Interpret labor relations policies for supervisory personnel, and assist in disposing of unsettled grievances.

Francis A. Yost, plant engineer, Fried & Reineman Packing Co., also president of Pittsburgh Plant Engineers' Association, chats with Richard H. Morris, editorial director, Plant Engineering magazine, and other plant engineers—L. N. Crow, plant engineer, George E. Drake Baking Co., B. J. Drummond, asst. plant engineer, Detroit Steel Products Co., and C. A. Wedge, plant engineer, Mine Safety Appliances Co., at the Plant Engineering booth, before taking in more of the Show

7. Actively assist in the establishment, review, and application of all safety programs and investigate all major and sub-major injuries.

8. Actively support and initiate programs for: a. The improvement of methods. b. The reduction of operating and maintenance costs.

2. The Maintenance Engineer or Supervisor

Primary Function: To administer and coordinate all activities covering field and shop maintenance work.

Duties and Responsibilities: 1. Responsible for the organization and functioning of the entire maintenance organization and the coordination of shop and field activity.

2. Through informative data, control the application of direct, indirect and general maintenance costs, budgetary control, and departmental and unit costs.

3. Through Job and Work Classification, control the distribution of maintenance wage roll personnel.

4. Through reports, contact with supervisory personnel, and others, guide improved programs covering: a. Shop layout, tools, and equipment requirements. b. Central prefabrication and assembly. c. Inventory control of maintenance materials. d. Preventive maintenance programs. e. Waste control. f. Quality of work.

5. Assist in the formulation and application of training programs.

6. Interpret labor relations policies for supervisory personnel and assist in disposing of unsettled grievances.

7. Actively assist in the establishment, review, and application of all safety programs. Review all major and sub-major injuries and reports.

8. Actively support and initiate programs for the improvement of methods and costs of maintenance work.

3. The Engineering Superintendent or Supervisor

W. F. Stuart (right) explains registration to J. E. Anderson and E. H. Martin, Continental Foundry & Mach. Co.

E. B. Skubik, Plant Engineering, and John J. C. Coffin, pl engr, Towle Silversmiths., also vice pres Boston Plant Engineers' Club, look over plastic model of completely mechanized foundry shown at Plant Engineering Booth

Primary Function: To provide and administer engineering service for the Works Engineering organization.

Duties and Responsibilities: 1. Responsible for the organization and functioning of the Engineering Assistance Section.

2. Through studies, reports, and related information, provide engineering methods, standards, practices, and recommendations dealing with : a. Shop layout—tool—and equipment requirements. b. Central prefabrication and assembly. c. Inventory control of maintenance materials. d. Job standardization and standard practices. e. Emergency job investigation. f. Transportation and handling problems. g. Execution of maintenance work. h. Correcting maintenance problems.

3. Assist in formulating and applying personnel training programs.

4. Interpret labor relations policies for supervisory personnel and assist in disposing of unsettled grievances.

5. Actively assist in the establishment, review, and application of all safety programs.

6. Render engineering assistance in the development and application of programs for the improvement of standard maintenance practices.

7. Supply engineering assistance in conjunction with projects, drafting, design and related activities.

8. Supervise plant construction.

As stated previously, portions of this paper have been deleted. Among these are the functions of Area Engineer for Central Crafts; Area Engineer for Field; and Shops General Foreman. Bound copies of the proceedings of the 4th Plant Maintenance Conference will be available at a later date from Clapp & Poliak, Inc., 341 Madison Ave., New York City, for a nominal sum. The Editors.

7. The Planning and Scheduling Engineer.

Primary Function: To assist in: a. Applying preventive and corrective maintenance. b. Development and application of effective procedures and controls for execution of maintenance and construction work.

Duties and Responsibilities: Under the direction of the Engineering Superintendent.

1. Make organization studies.
2. Assist in the use of all maintenance tools and controls.
3. Through analyses of repair orders, assist in establishing standard maintenance practices and standard costs.
4. Analyze all maintenance costs, by operating departments. Establish graphic relationships between: a. Production, and maintenance costs. b. Capital inventory and maintenance costs.
5. Assist in the application of Work Classifications to all crafts and groups. Assist in using these requirements to develop employment and rating questionnaires.
6. Analyze work to improve shop layouts, tools, and equipment.
7. Review both major and recurring jobs for possibility of using Centralized Prefabrication and Assembly.
8. Assist in training clerks in maintenance procedures.

J. E. Gajarsky, project engr, and F. L. Bradley, plant engineer, both of Forstmann Woolen Co., look over program

9. Assist in training programs for supervisory personnel.
10. Assist supervision in training wage roll personnel in standard practices.
11. Investigate emergency jobs and submit reports indicating:
    a. Cause b. Correction
12. Assist foremen in control of labor requirements.
13. Assist foremen in the application of Planning and Scheduling.
14. Review inspection procedures for adequate application and coverage.

Very early in my experience in maintenance consulting I learned that the

two things most needed to promote good maintenance were: a. A thorough understanding of what maintenance is. b. How maintenance should be done by a good maintenance organization.

Two things were needed: 1. Tools or principles covering all phases of maintenance work and, 2. An understanding of these by all levels of a maintenance organization.

Indications were that attainment of these ends would require time, and trained engineers, which were not then available. I then set out to establish a Planning and Scheduling Engineer in the maintenance organization on each plant. By this means I intended to get these maintenance principles working, and establish controlled work execution.

R. B. Lautner, supt., Solvay Process Div., Allied Chemicals & Dye Corp., and Lee Minion, Rapids-Standard Co., Inc.

After control of repairs came preventive maintenance through inspection and overhaul schedules, the scheduling of all routine, repetitive jobs, the promotion of job improvement, etc.

What was the result of all this? First, costs were reduced. Then, weaknesses in the maintenance picture were spotted and Engineers were added to the maintenance organization. But, the training of these engineers in the principles of good maintenance became a very necessary factor.

I mention training at this time because of its importance as an integral part of any smooth working organization. However, training programs should not only cover orientation subjects, leadership, etc. They should also cover the working tools used every day as definite duties and responsibilities of supervisory personnel.

No maintenance organization can apply maintenance principles, prevention and correction, plant improvement, etc., with its regular supervising organization. This will come as a disagreeable surprise if it measures its actual performance as such.

Maybe some of you are asking yourselves: "Just how does this fit into my plant?" or "What can I afford in the way of service or consultant activities to improve my maintenance performance?" or "How can I sell my management on the application of some of these things?"

Let me give you my own experience in these matters. For the average size plant, my suggestion would be to attempt to install both Shops and Area Organization. Then, for proper controls, set up a technically-trained engineer as a Planning and Scheduling Engineer. This man should have some plant experience. It matters not whether that experience is maintenance or operating. Then, see that both foremen and wage personnel are trained—foremen in the various controls for best work execution; wage roll personnel according to their craft or work requirements.

In order to sell Management use the very simple approach. Plot charts of maintenance performance over a period of years, using four main factors: 1. Capital investment. 2. Maintenance cost as per cent of investment. 3. Production in pounds, tons, or units. 4. Pounds of production per maintenance dollar.

In this approach, I would use the Construction Labor and Material Index figures to correct maintenance dollars covering production per maintenance dollar. If this is done, it is my belief that management will be quite surprised at the results, and would be interested in improvement.

Supervision Quota

Other factors which have been debatable as an organization are: a. The number of foremen the General Foreman or Area Engineers should supervise; and b. The number of wage roll personnel a foreman should supervise.

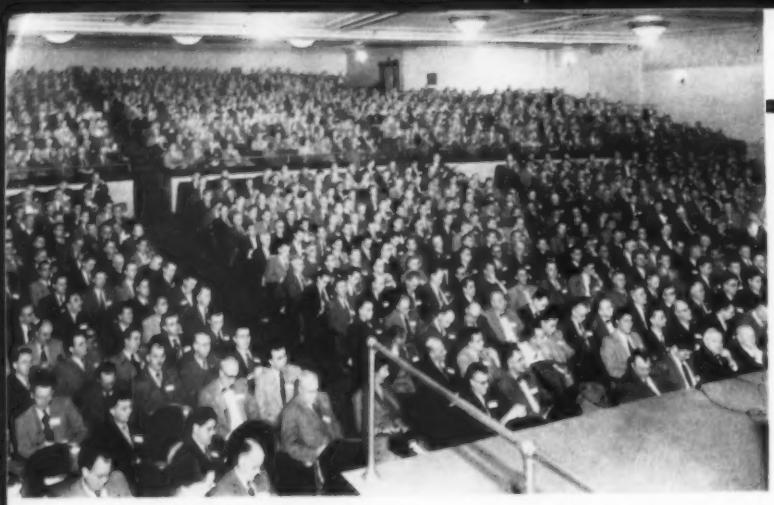
I do not believe a General Foreman or an Area Engineer should supervise more than 4 to 6 foremen. It must be remembered that these supervisors also operate upward to Operating Supervision and to the Maintenance Supervisor; and downward in seeing that their foremen understand proper work controls and get the work done. In the case of the foreman, experience indicates that 15 men per foreman can be successfully operated in the field, and 20 to 25 men, in the shops.

Interested group of men gather around R. F. Whitell, Toledo dist sales mgr (center) of The DeVilbiss Company

The question of how far a plant can go in using consultants or service assistants is, to my mind, simply one of cost. If a maintenance organization is: a. Effectively executing repairs; b. Utilizing preventive maintenance schedules; c. Using technical and service assistants to correct bad-acting equipment; d. Is showing reduced costs, that is the answer. It has always been my feeling that if the maintenance head of a plant is made to realize that maintenance is his responsibility and he is given the means to correct any abnormal conditions, it will not be hard to sell him on progressive job improvement, at any time.

The need for close cooperation with the Operating organization is another important factor. The change-over of the maintenance organization from a strong control craft organization to a craft and area organization was for that purpose. Where both operating and maintenance coordinate for the common good, you will always find a plant with: minimum down-time and low maintenance costs resulting from such cooperation.

J. Parker, advertising manager, Graton & Knight Co., discusses company's industrial leather products with W. P. Youngclaus, Jr., administrative secretary, American Society Lubrication Engineers, while P. G. Hamill, the Ohio manager, looks on



Conference sessions such as this one were held in the main meeting rooms of the Cleveland Auditorium. This phase of the Maintenance Show presented a comprehensive series of lectures on maintenance practices in industry. Speakers, recruited from industrial plants throughout the country, prepared their talks on basis of experiences. (See quotes below)

And the Other Speakers Said—

E. A. LeGros, Pepsodent Division, on Problems in Plant Engineering: "Although the plant engineer is not responsible for developing the budget and accounting practices, he must at least become thoroughly familiar with those practices that affect his department. This is a fairly large and distasteful problem to tackle."

M. A. Cavanaugh, The Budd Co., on "Maintenance of Mechanical Equipment: "It is of primary importance that each member of the organization be cost-conscious and record-conscious; you alone would find it exceedingly difficult, if not impossible, to follow up all details in a plant even of small size."

Robert G. Edsall, Westinghouse Electric Corp., on Maintenance of Electrical Equipment: "Routine inspection is probably the most effective means of preventing electrical equipment from causing serious power outages and work stoppages. Such a check at predetermined intervals is worth the expense involved."

M. W. Reid, General Electric Co., on Organizing the Maintenance Activities: "[In reorganizing] an adequate plant engineering group was established, trades were coordinated, preventive maintenance was promoted, costs were controlled and reduced, methods were improved and training programs introduced."

Walter J. Adams, J. M. Lehman Co., Inc., on Maintenance in Small Plants: "The day a fully automatic plant is built the maintenance department will constitute the sole operating personnel . . . and bear responsibility for the product. In some of our industries such a plant is foreseen for the predictable future."

Edward J. Reitz, Carborundum Company, on Maintenance in Medium-Size Plants: "Doing ordinary plant maintenance . . . is not good enough today. To operate a successful program it must be controlled. You should know your present work load, the work load ahead, and your allowed costs to do this work."

R. C. Thiede, General Aniline Works, On Corrosion Prevention and Control: "In dealing with corrosion problems keep in mind that alloys were developed for specific conditions and are not to be regarded as cure-alls; adequate tests should be made prior to large investments involving such alloys."

A. D. Buschmann, Perfection Stove Co., on Maintenance in Small Plants: "The best basic organization is probably the line or army type with authority flowing down from the top and response upward from the bottom. . . . There is a strong incentive to meet schedules when every man in the advisory group has taken part in initial plans."

Charles I. Fishkin, Monsanto Chemical Co., on Maintenance of Power Plant Equipment: "Keeping a complete record of repairs gives us a chance to: 1. Decide how much good was done and how much money and time was wasted. 2. Decide how long we should wait before the next overhaul based on conditions found on last job."

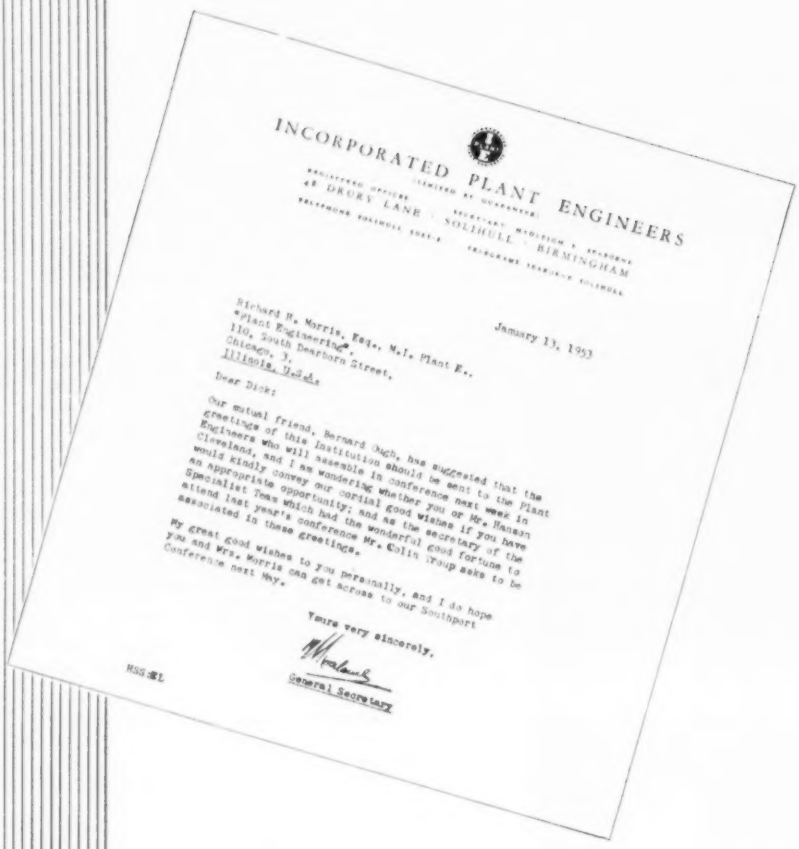
J. E. Gahagan, Ansco Division, on Problems in Plant Engineering: "An annual report [for management] shows the results of the year's engineering activity, together with data for the previous year, in terms of work accomplished and costs for such items as new capital facilities, plant maintenance, and utility services."

O. W. Graveley, Electro-Metallurgical Div., on Maintenance in Medium-Size Plants: "Management is not doing its job unless it actively participates in one of its major problems—maintenance. The principles of management, as applied in good production practice, work equally well with maintenance production."

George J. Martin, National Biscuit Co., on Preventive Maintenance: "The fear that with the installation of new maintenance programs greater costs would develop, has been found groundless. Sufficient maintenance cost data have indicated results and savings much greater than originally anticipated."

J. R. Sautter, E. I. du Pont, on Problems in Plant Engineering: "The over-staffed department will operate in a costly and inefficient manner. The under-staffed department is one that will, because of lack of sufficient technical knowledge, too often lead to incomplete engineering; it can be costly, too."

Richard S. Austin, American Cyanamid Company, on Maintenance of Buildings: "We believe a building is in good condition when it is structurally safe, reasonably attractive, and when its maintenance is of a preventive nature. When more than preventive maintenance is required on a permanent building, it should be brought up to a standard."



INCORPORATED PLANT ENGINEERS

(LIMITED BY GUARANTEE)

REGISTERED OFFICE
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SECRETARY: MIDDLETON 4, ARCADE
TELEGRAMS SEARCHLIT SOLIHULL

January 13, 1953

Richard H. Morris, Esqr., M.I. Plant E.,
"Plant Engineering",
110, South Dearborn Street,
Chicago, 3,
Illinois, U.S.A.

Dear Dick:

Our mutual friend, Bernard Dash, has suggested that the greetings of this Institution should be sent to the Plant Engineers who will assemble in conference next year in Cleveland, and I am wondering whether you or Mr. Hanson would kindly convey our cordial good wishes if you have an appropriate opportunity; and as the secretary of the Specialist Press which had the wonderful good fortune to attend last year's conference Mr. Colin Troup asks to be associated in these greetings.

My great good wishes to you personally, and I do hope you and Mrs. Morris can get across to our Southport Conference next May.

Yours very sincerely,

General Secretary

HSS:EL

Many of you were at the Plant Maintenance Conference and Show. Many of you dropped in at PLANT ENGINEERING'S booth and said hello. Some of you—when our photographer could be found—had your pictures taken beside the model (plant, that is). Some of those pictures, as you have seen, appear in this section. Many pictures taken in other booths are presented, too. Regardless of whether or not you came to the Conference and Show, however, we hope you have enjoyed this special report.

The unselfish exchange of information among engineers and industrialists has been a major factor in America's industrial growth. It is through conferences such as this, plus the parallel work of the business and industrial press aided by men like yourself, that the information has been made available to all engineers.

We know you are taking advantage of these unmatched opportunities to discover how others are doing their jobs, what new materials, methods and equipment are available to help you with your own work. We, in PLANT ENGINEERING, pledge ourselves to work with our readers in the future as in the past. If we can be of help, call on us.

"Atmosphere photo" by Westinghouse Electric Corp.

Plant Engineers' Primer FOR SELECTION OF STEELS

Is steel costing you too much because you don't know what kind to order? . . . Are you buying too many kinds to meet your needs . . . Has your steel inventory increased out of reason? . . . If so, this guide to steel selection, prepared by a man who knows the steel warehousing, buying and specifying business, should be of some help

By J. G. **BALDWIN**

WHEN A PLANT ENGINEER is trying to select a steel for a particular application the number of steels available becomes a puzzling problem. Steel companies have done a grand job in developing different steels to satisfy almost an endless list of applications, but in so doing they have complicated the buyer's job of making a correct selection from them.

Frequently one buys a steel that is much too good and therefore expensive just to be on the "safe side," or he may choose the wrong type of steel for his use. In other cases he may be buying a different type for each of his requirements, thus increasing his inventory and wastage problems when two or three types would serve all of his needs satisfactorily.

This is not at all strange, inasmuch as a steel company may offer fifty or more kinds of steel and perhaps put a trade name on half of them. Multiply these by the number of competing companies in the area and you have a formidable list of steels to choose from. However, the situation facing the buyer is not nearly so difficult as it may appear to be.

True, there are on the market literally hundreds of different kinds of steels, but many of these will conform to certain classes which are used in pretty much the same way for applications which are very much alike.

Most of the steels which are commonly used may be divided into three main classifications: low carbon, medium carbon, and high carbon. These steels are further qualified by finish and type of manufacture. There are, generally speaking, only three kinds of finish, namely: hot-rolled or as-rolled, cold-finished, and pickled-and-oiled. And the types of manufacture are limited to three also: open hearth, Bessemer and electric furnace. Therefore, any of the carbon steels can be identified by these three qualifications: carbon content, finish, and kind of furnace which produced it.

The list of definitions included will explain the types of manufacture and types of finish. The remaining dis-

tinguishing characteristics of a steel, carbon content, is the most important. It is the carbon content of a steel which determines its general classification or the application for which it may be used.

The strength and hardness of steels depend upon this carbon content. For this reason we have the three main classifications, namely: low carbon, medium carbon, and high carbon. Reference to the classification chart will show low carbon steels to have 0.10 per cent to 0.25 per cent carbon; medium carbon, 0.35 per cent to 0.50 per cent carbon; high carbon, 0.60 per cent to 1.20 per cent carbon.

Certain names given such as "soft steel" or "machinery steel" have no authority, but the steel buying trade frequently considers them as shown. "Machinery steel" might mean one thing to one user and to another the interpretation might be quite different. For this reason it is well to definitely identify a steel by carbon content, finish, and type of manufacture. This can be done simply by using the standard AISI (The American Iron and Steel Institute) symbol which indicates both analysis and type of furnace used in its manufacture. The letter and first two numbers of the symbol are the key to the type of steel and the last two numbers carbon content. In addition to the AISI symbol, the finish should also be given when ordering steel.

Generally the low carbon steels are used for general purposes and for case carburizing. The medium carbon steels are used where greater strength and hardness is required or where heat treatment by quenching and drawing is to be used. The high carbon steels are used where extreme hardness and toughness are required.

This degree of difference is noted in the classification chart by giving the different tensile strengths of several low carbon, medium carbon, and medium carbon alloy steels in the hot rolled, cold drawn, and heat treated conditions. Hardness of these various steels is directly proportional to their tensile strengths.

It will be noted that the strength of the medium carbon alloy steel in the as-received condition is about the same as that of a medium carbon steel. However, the yield point of the heat treated alloy steel is considerably greater than a similar carbon content straight carbon steel.

Trade name steels, which were mentioned in the beginning of this article, should be investigated as to analysis and physical properties and, if possible, resolved to an AISI symbol for simplicity in comparing

Table II. Definitions and terms commonly used in discussing and specifying different types of steels and their properties

TERM	DEFINITION
OPEN HEARTH STEEL:	Steel made in Open Hearth Furnace. Most steels are made this way.
BESSEMER STEEL:	Steel made in the Bessemer Furnace. The so-called "screw stock" steels are made by this method. These steels machine more easily than the others, but are more brittle than similar Open Hearth Steels.
ELECTRIC FURNACE STEEL:	Steel made in the Electric Furnace. The finer grades of steel and many of the special steels are made this way. Finer quality results by processing a smaller quantity of steel under more uniform controls.
HOT ROLLED STEEL:	Steel as it leaves the rolls of the hot processing mill with no subsequent cold working for finish or size. The surface of this steel may have some mill scale and is not close to size such as cold finished steel.
COLD FINISHED STEEL: (may be cold rolled or cold drawn or cold finished by turning or grinding.)	Steel that has been cold worked for the following purposes: to remove mill scale; to bring the material close to size; and to bring a bright finish to the surface of the material. Cold working of steel hardens (and thereby strengthens) the surface of the material.
PICKLED AND OILED STEEL:	Hot Rolled Steel which has had the mill scale removed by pickling. This finish appears similar to a cold finished steel, and is preserved by oiling.
TENSILE STRENGTH:	The amount of pull necessary to break steel apart. This is expressed in pounds per square inch and for ordinary hot rolled, low carbon steels, this figure is approximately 60,000 lb.
YIELD POINT: (of Elastic Limit)	The amount of stress necessary to permanently deform steel. Steel thus deformed has been stretched beyond its elastic limit and will not return to its original shape when the stress is released. For ordinary low carbon, hot rolled steel, the Yield Point is approximately 40,000 psi.
HARDNESS:	The degree to which the surface of a steel resists deformation.
HEAT TREATMENT:	The process of heating steel followed by quick cooling for the purpose of increasing the physical properties of the steel. If carbon is added during the heating process to a low carbon steel, the operation is called "case hardening."
CARBON STEEL:	An alloy of iron and carbon in which the presence of other metallic elements in small quantities does not materially affect the physical properties of the steel.
ALLOY STEEL:	Those steels which contain a sufficient amount of metallic elements other than iron and carbon such as nickel, chromium, molybdenum, vanadium, tungsten and manganese to affect the physical properties of the steel, particularly as a result of subsequent heat treatment.

Table I. Applications for steels and the types of steels which may most appropriately fill any particular application

CASE	STEEL TO BE USED
Forging, fabrication, welding, and general purpose:	Low carbon, hot rolled, open hearth.
Free machining the only criterion:	Low carbon, Bessemer.
Free machining where strength is required:	Open hearth free machining steels.
High stress requirement:	Medium carbon.
Surface hardness or deep hardness penetration under heat treament:	High carbon.
Resistance to corrosion and heat:	Generally one of the chrome-nickel stainless steels is the selection for these applications.
Deflection:	If a long bar such as a shaft is deflecting excessively under load, it will be necessary to increase the size of the bar in order to eliminate the trouble. All steels regardless of strength will sag or bend or stretch the same amount for any given load up to the point of permanent deformation (yield point).
Machining cold finished bars:	When machining cold finished bars under $2\frac{1}{8}$ in. diameter, it is well to know that these bars are generally produced by cold drawing to size through a die. If a bar of some length is to be machined such as a lead screw or a shaft with a long key-way, a cold finished bar that has been stress relieved (or a hot rolled bar turned to size) should be used as the ordinary cold drawn bar having been stressed by cold working may twist out of shape when machined.
Low stress requirement or case hardening:	Low carbon.
Wear:	There is no thumb rule that will be helpful so far as surface wear is concerned and none of the ordinary steels is measurably better for various conditions of abrasive surface wear. A special study of each case is required and the following steels might be considered: nitrided nitralloy, self hardening manganese steels, and properly heat treated tool steels.

with other steels. The mere fact that a certain steel stands up under a particular application is not proof that a good selection has been made.

If a straight carbon steel has the correct physical properties, the expense of an alloy steel should be avoided; and an alloy steel, for the same reason, is preferable to a tool steel. On the other hand if free machining is the criterion, screw stock or one of the free machining grades of open hearth steel will more than offset the slight increase in cost.

Table III. AISI symbols and physical properties of various kinds of low carbon, medium carbon and high carbon steels

LOW CARBON (0.10 TO 0.25 PER CENT CARBON)

Mild Steel, Soft Steel, Machinery Steel, Boiler Plate, Band Iron, Structural Steel, Plates, Sheets and Strip, Welding Quality Steel, and General Purpose Steel	Open Hearth, Hot Rolled — Typical Symbol AISI C1020
Screw Stock, Accuracy Stock	Bessemer, Cold Finished — Typical Symbol AISI B1112
Carburizing Steels	Any low carbon steel
Free Machining Bars and Plates	Open Hearth — Typical Symbol AISI C1117
Shafting	Open Hearth, Cold Finished—Typical Symbol AISI C1020 or C1117
Low Carbon Alloy Steel	Chrome-Molybdenum AISI 4615—Open Hearth or Electric Furnace
	Chrome-Nickel AISI 3115—Open Hearth or Electric Furnace
	Chrome-Nickel-Moly AISI 8620—Open Hearth or Electric Furnace

Physical Properties of Low Carbon Steels

Steel	Tensile	Yield
AISI C1020 Hot Rolled	65,000 lb/sq in.	43,000 lb/sq in.
AISI C1020 Cold Drawn	78,000 lb/sq in.	66,000 lb/sq in.
AISI B1112 Cold Drawn	82,000 lb/sq in.	71,000 lb/sq in.
AISI 8620 Hot Rolled	93,000 lb/sq in.	65,000 lb/sq in.
AISI 8620 Cold Drawn	110,000 lb/sq in.	95,000 lb/sq in.
AISI 8620 Carburized, quenched, and drawn at 300 F	148,000 lb/sq in.	125,000 lb/sq in.

MEDIUM CARBON (0.35 TO 0.50 PER CENT CARBON)

Medium Carbon Steel, Lead Screw, Arbor or Spindle Steel, Heavy Duty Machine Parts, Flame or Induction Hardening Steel	Open Hearth — Typical Symbol AISI C1045 and C1141
Free Machining Bars and Plates	Open Hearth — Typical Symbol AISI C1141
Shafting	Open Hearth — Typical Symbol AISI C1045 and C1141
Medium Carbon Plates and Sheets	Open Hearth — Typical Symbol AISI C1045
Medium Carbon Alloy Steel	Chrome-Molybdenum AISI 4140—Open Hearth or Electric Furnace
	Chrome-Nickel AISI 3140—Open Hearth or Electric Furnace
	Chrome-Nickel-Moly AISI 8642—Open Hearth or Electric Furnace

Physical Properties of Medium Carbon Steels

Steel	Tensile	Yield
AISI C1045 Hot Rolled	98,000 lb/sq in.	59,000 lb/sq in.
AISI C1045 Cold Drawn	103,000 lb/sq in.	90,000 lb/sq in.
AISI C1045 Water quenched and drawn at 1000 F	120,000 lb/sq in.	90,000 lb/sq in.
AISI 8642 Hot Rolled	93,000 lb/sq in.	63,000 lb/sq in.
AISI 8642 Cold Drawn	105,000 lb/sq in.	90,000 lb/sq in.
AISI 8642 Quenched and drawn at 1000 F	149,000 lb/sq in.	128,000 lb/sq in.

HIGH CARBON (0.60 TO 1.20 PER CENT CARBON)

Spring Steel, Chisel and Shear, Blade Steels, Drill Rod, Carbon Tool Steel and Alloy Tool Steel	Open Hearth or Electric Furnace
High Speed Steels	Electric Furnace

MACHINES TO BE OVERHAULED OR RECONDITIONED

PLANT NO. #3 - Wisconsin DATE: 10-15-51

DEPT. NO. 26-3 DEPARTMENT NAME Cutter Grind ____ Sheets Sheet No. ____ CHECKED BY: A. J. Stork

Machine Name	Size	Tag No.	Serial No.	Age	Date Of Last Overhaul	Pres. Cond.	Used On	Can It Be Spared?	What Machine To Replace It?	Work Required To Recondition
Delta Grinder (Toolmaker)	24-105	972	61-5892	1948	-	Fair	Cutter Grind	Yes	Use Machine #684	Repair rack & pinion (Table Feed) scrape in table
Delta Grinder (Toolmaker)	24-105	684	32-326	1944	-	Fair	Cutter Grind	Yes	Use Machine #971	Scrape ways-new rack & pinion Table Feed
Milw. Plain Mill	#2	436	8-2026	1937	-	Poor	Cutter Grind		Use Machine $467	Scrape in table & Column. New gib, new feed screw & nut.
Barber Colman Hob Grinder	4-H.S.	B-20 86	132	1942	-	Fair	Cutter Grind	Yes	Use either one of five machines if one mach. is repaired at a time	Machine constantly being repaired.
Barber Colman Hob Grinder	4-H.S.	531	65	1941	-	Fair	Cutter Grind	Yes	" " "	" " " " "

Fig. 1. The entries shown here report the findings of a general plant survey of machine tools made by a machine specialist

Machine Overhaul Program Depends on Paperwork, Procedure

Forms offer running records of daily repairs . . . Their effectiveness rests on their processing and maintenance

By D. E. SHOREY, Plant Engineer, Wisconsin Axle Div., The Timken-Detroit Axle Co., Oshkosh, Wis.

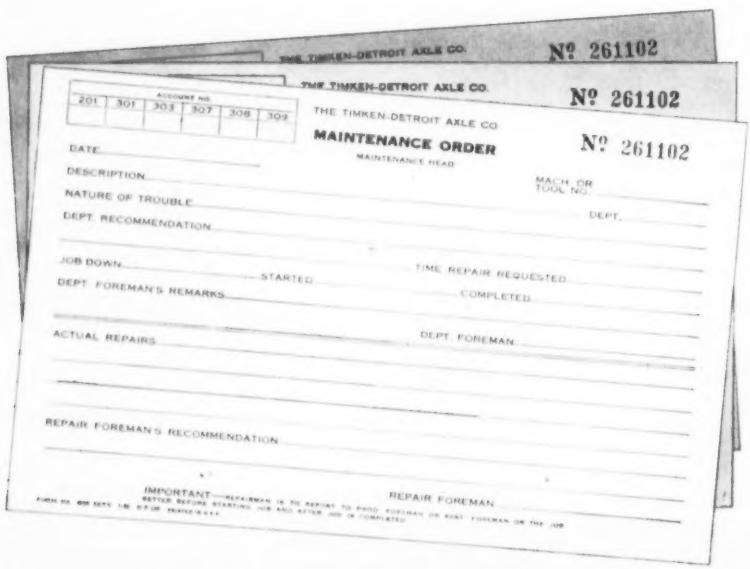


Fig. 2. Machine repairs require writing of maintenance order in triplicate

THE MACHINE TOOL program at Wisconsin Axle provides for planned repair and overhaul of equipment with minimum interference to production. It promotes the maximum use of overhaul facilities and expeditious handling of repairs. The details of this planned system were covered in the Jan. 1953 issue beginning on page 84. Paperwork and procedure to make the program effective are covered in this part of the article.

To supplement the survey forms, Fig. 1, which summarize the results of the inspection work done by A. J. Stork, machine specialist from the company's Detroit office, the plant engineer's office maintains paperwork on machine tools in the plant. These forms are used to accumulate information on daily repairs to machine tools.

Reference to these may reveal the status of repairs, the length of time between repairs and any repetition of trouble. They could also be considered as indicators of machine performance. If a piece of equipment was originally listed on the survey sheet as being in a ques-

tionable condition, the entries on a machine reference chart, Fig. 4, can hasten its shipment to the repair shop.

To get a better idea of the part that paperwork plays in this overhaul program, a report on the procedure followed to keep track of repairs to the machine tools is presented. In the case of a machine breakdown or defective performance, it is necessary that a maintenance order, Fig. 2, be initiated in triplicate. This is normally done by a person in production who is responsible for the machine. He may be a foreman or his assistant.

The original of the maintenance order and one copy is forwarded to the plant engineer's office. Here, the original is retained for further attention and the copy is given to the repairman who is assigned to the repair job. The second copy of the order is kept in the office of the person who originated the repair request.

The next step is taken by the clerk in the plant engineer's office. The information appearing on the order is copied unto a trouble sheet, Fig. 3. The latter is available for quick reference in the event that someone wants to know what is being done about repairing a certain piece of equipment. If work is being held up, the reason should appear on this sheet. This form provides the plant engineer and interested people with a bird's-eye view as far as the status of outstanding repairs in the plant is concerned.

With the completion of a repair job on a machine, the man who supervises the repair work takes out his copy of the maintenance order. He writes his report on it and sees that the form gets to the plant engineer's office. At this point, the maintenance clerk enters the nature of the repair from the maintenance order copy on the machine reference chart with the total manhours that have been expended. The time is picked up form the job cards that repair men punch in and out.

Fig. 3. Information from maintenance order is briefly noted in trouble column. Comments cover progress that is being made on the various jobs

MACHINE	DATE OF ORDER	COMPLETE	TROUBLE	COMMENTS
1018 Lees Bradner	3-A		Mob Arbor	Waiting on Bake
737 Mill & Center 55	2-12		Oil Pump	On order pump or corner of my desk for L. H. head fixing machine.
Drill Head 57	2-12		Spindle Bro	Parts on order
558 Motor 52	2-5		Tail Stock	Waiting on Tailstock
598 Bullard 53	1-19			Waiting on Parts (Pulley)
515 GE 51				Parts in waiting to get machine
296 Gleason 51			Parts	On order
B-3489 Drill Head 54			Spindles	Parts ordered 3-7
857 Gisholt 54	3-7		Drive Pulley	

The second copy of the maintenance order is sent by the production foreman's office to the time office. This is also done upon the completion of the repair job.

The accumulation of entries on the machine reference chart formulates what may be called a "case history" on a specific unit. This information can be useful in arriving at a decision on the over-all condition of a machine. It can also be used to help determine the point at which emergency repairs are no longer practical and at which the machine should be scheduled for shipment to the repair shop.

The Quality Control department has been keeping control charts on some of the production equipment in the plant. These can serve not only as production tools in keeping track of the quality of work but also in picking up defective machine performance. This may be indicated by plot points falling outside of control limits for reasons other than those assignable to the operator. Tentative plans for the future call for expanding use of these charts.

MACHINE REFERENCE

Machine No. 534

Department No. 51

Serial No. 19399 Name & Model Fellows Gear Shaper 615-A Date Purchased 1941

Motor No. M-320 Cycle _____ Phase _____ H.P. 3 R.P.H. _____ Voltage _____

MOTOR & MACHINE RECORD SERVICE

Date	Actual Repairs	Labor	Maintenance	Repaired by
8-7-51	replace gears	1.5-		E. Ulrich
8-9-51	replace gears	2-5		E. Ulrich
10-15-51	reverse valve lever for impact wrench	3		
12-14-51	adjust for finish	3	152529 check spindle	E. Ulrich
12-28-51	replace gears	2		E. Ulrich
1-6-52	machine repair	2		E. Ulrich
1-24-52	machine repair	3.5	154755 tight bearings	E. Ulrich
2-16-52			146933 remove guide	
2-25-52	repair motor	2		W. Kasten
2-25-52	machine repair	8.	Main 155054 adjust blocks on machine	E. Ulrich
4-23-52	machine repair	2		E. Ulrich
6-27-52	machine repair	2		E. Ulrich

Fig. 4. This reference chart carries information on one machine only. As data accumulate a "case history" evolves

Photo: National Clay Pipe Association

This vitrified clay pipeline, 350 ft long, supported by pedestals, handles two million gal of industrial waste water per day. Sketch of pipeline is shown below

Industrial Waste Pipeline Modernizes Old Mill Trench

By CLARENCE F. LAMB, Designing Engineer, Partner of Waterman Engineering Co.

POLLUTION ABATEMENT has presented many problems to the engineer called upon to design and build an industrial waste handling system.

In many cases, the industrial plant is alongside a river; thus, it also lies in a valley or on the side of a hill. Because of this topographical location, the problem becomes not only one of properly collecting the wastes within the mill, but after collecting them, lifting them to a trunk sewer and thence to a disposal plant.

Such was the case with a textile dyeing mill in Pawtucket, R. I., owned by the Main Realty Co., which was located below a dam and along a river. Until 1925, the dam had been the source of water to operate the water wheels in the mill. Since that date, however, this power source has been untapped, and the water wheels were abandoned. But the mill trench, which is 12 ft square in cross section, still remains. However, it flows in the opposite direction to that in which any collector line for wastes could flow and still be within reasonable distance of the existing municipal trunk sewer. Therefore, it was in itself of little use. Complete abandonment of this trench, however, was deemed wasteful, and a means was sought to put it to use.

It was decided that a pedestal-supported collector line would be built in this trench to collect all the wastes from the dyeing machine and sanitary equipment. Vitrified clay pipe was chosen for the line, because its resistance to acids and other industrial wastes made it ideal for the application.

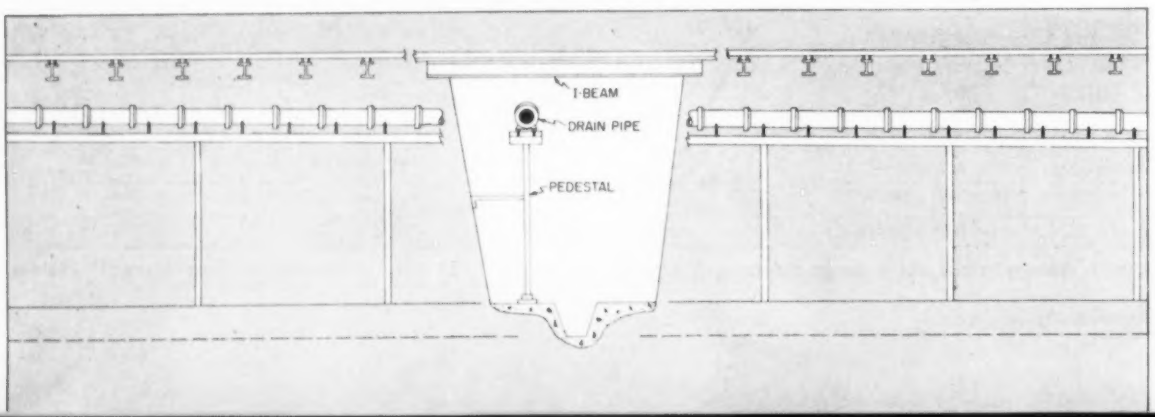
The collector main is now located in the old water trench, just below the floor of the dye house. It is about 350 ft long, constructed of 12- and 15-in. vitrified clay pipe. It is laid on a one per cent grade, and is capable of handling two million gal of industrial waste per day. Every 12 ft along its length, it is supported by a 4-in. H beam pedestal, extending some 9 or 10 ft above the bottom of the trench. Each pedestal has a side brace for additional support. The pedestals carry 2 parallel 6-in. steel beams, on which steel cradles, formed to the OD of the clay pipe, are installed every 3 ft. Every other pipe section has a 12-in. T fitting to receive the various wastes from the floor above. All wastes enter the main through these T fittings. Those fittings not in use, together with the manholes along the line, act as overflows should the pipe become clogged at any time. The overflow runs into the trench, and then to the river.

The joints of the pipe are caulked with two strands of oakum, and then filled with sealing compound, flush with the outside of the bell. A collar, reinforced with wire mesh, is placed over each joint.

The wet well was constructed in the trench at the lower end of the pipeline, with a 12-in. wall between it and two 500 gpm pumps. All wastes are pumped to the municipal trunk sewer through an 8-in. force main. Recorders that totalize, indicate rate, and record discharge, monitor the performance of the pump.

The volume of the wastes varies throughout the day, depending upon the operation of the washing, bleaching and dyeing equipment. The nature of the wastes, recorded as to daily usage, is as follows: 400-500 lb of caustic; 200-400 lb of sodium chloride; 2-4 lb of sodium sulfide; 10 lb of sulfuric acid; 10 lb of nitrate of soda; 100 lb of soap and detergents; and some phosphate for water softening.

The cost of the installation, including preparation of the trench and installation of all mains, pumps, meters and auxiliary equipment, amounted to $40,000.



2....

FLUORESCENT LAMPS— General Characteristics

This is the first of two articles on fluorescent lamps . . . This section discusses: . . . Power factor correction . . . Hum and flicker . . . Starting fluorescent lamps . . . Hazards avoided . . . And, hot and cold cathode lamps

By **LEONARD V. JAMES**, Illuminating Engineering Consultant

SINCE 1938, WHEN fluorescent lamps were first demonstrated commercially, they have become increasingly popular until today it is reported that more illumination is being provided by them than by all other light sources. Under the circumstances, plant engineers have become familiar with their use and, to a considerable extent, with their characteristics. This series of two articles is therefore not intended to be an introduction of the lamps. Rather it is to be an explanation of some of the reasons for their behavior and for their operating requirements.

Initial Criticisms

Perhaps a good way to approach the subject would be to recall the arguments advanced in the early days against adoption of these new light sources. Electric power companies immediately and properly objected to the low power factor. There was a suspicion that some of these companies also silently objected to the increase in light produced, per watt, to at least double that from incandescent lamps. This might be expected to reduce their revenue. Then there was considerable objection among users to the hum, at first very noticeable.

Always the critics remarked about the objectionable flicker and the non-uniform delayed starting. Then the question soon developed as to whether lamps of the "hot cathode" or the "cold cathode" variety were to be preferred. Many objected to the physical size of the lamps and of the fixtures or luminaires to serve them.

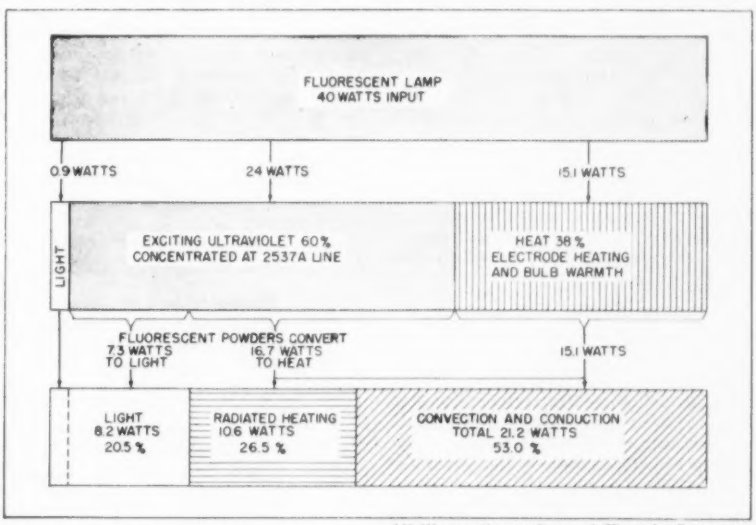
Many users complained about the color of the light, so different from that delivered by the universally-used incandescent lamp or the occasional flame source. As though this were not enough, some doctors warned of harmful radiation, from the "arc" discharge within the tube. And then the high cost of the lamps, relative to incandescent bulbs, constituted a serious objection in the minds of many economy-minded managers and operators, until they had an opportunity to analyze the matter from every standpoint.

Helpful for Good Lighting

With all these faults, it seemed evident that the fluorescent lamp and lighting equipment industry would die a-borning. As everyone knows, just the opposite occurred. The reasons were scientific skill in eliminating or meeting all objections, plus the fact that here was a light source of great inherent merit.

The matter of utility revenue was settled quickly and definitely. True, some salesmen of fluorescent equipment promoted the idea of securing the same amount of light from less connected load. The trouble was that those using the light did not want the same level of illumination. They had been hearing about the benefits from more light, many had experimented with it and liked it—all but the added heat. Now they could get this additional light from the same watts and they were not slow to do so.

Nor was this all. The fluorescent lamp is a virtually cool source and more of the watts dissipated as heat are conducted and convected away than is the case with hot filament lamps. So the reduction in radiated heat permitted an increase even in watts, without more discomfort. (Five times the footcandles with fluorescent at a drafting board, as compared with incandescent, has been found to produce about the same discomfort from radiated heat.) (See Fig. 1.) In addition, the low brightness of the fluorescent lamp made possible a reduced



All illustrations: General Electric Company

Fig. 1. This chart shows the distribution of the watts supplied to a 40-w fluorescent lamp. The first step shows those expended in heating the lamp structure, in agitating the fluorescent powder and in creating a small amount of light as from a mercury lamp. The powder converts part of the energy it has received into light, the rest becoming radiated heat and added heat in the lamp structure. The total energy output in light is over 20 per cent of all that is supplied

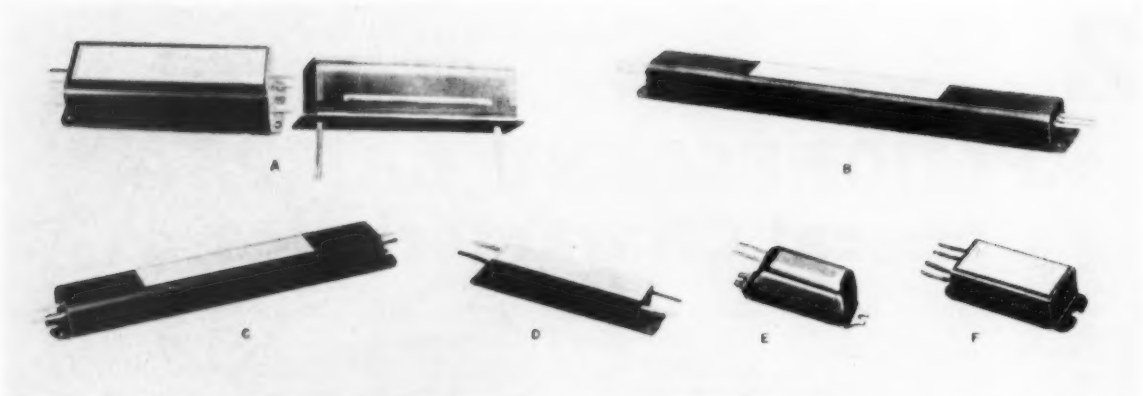


Fig. 2. Several typical ballast cases for hot cathode lamps. Select type of ballast by operation desired. Large cross-section types (such as A, for two 40-w "preheated" lamps) are usually considered better from a low watt standpoint

screening of the source in some cases and thus a higher utilization. It is not surprising, therefore, that general lighting installations delivering 40 to 60 ft-c are more common today than those producing 10 to 15 ft-c fifteen years ago.

The reasons for the desire for higher levels of illumination, for

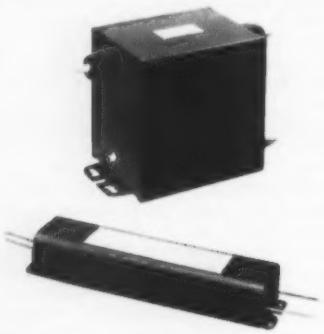


Fig. 3. The slender ballast is for cold cathode lamps operated in multiple; the larger box shaped type is for series operation at a high open circuit voltage of 12,000. Other ballast models provide a voltage range from 2,000 to 15,000 v

greater, better and more economical production, do not belong in this study. Many of these have been indicated in an article by this author in January, 1953, PLANT ENGINEERING, on the subject "Lighting for Seeing in Industry."

Power Factor Correction

Because a low power factor would require more copper and larger transformers for the same actual load, it could not be tolerated in a large installation. The power factor of the lamp itself, despite some current wave distortion, is high. However, the discharge of the current through the gas in the lamp tube is unstable, in much the same way as is the current in an arc. As more current flows, the resistance to the discharge decreases, permitting still more current to flow, etc. So a current limiting device or "ballast" is needed. (See Figures 2 and 3.)

Were this ballast in the form of a resistor, much energy would be absorbed and the efficiency of the system reduced. Despite this, a resistor is required for direct current circuits. For alternating current, the ballast is an auto-transformer with high magnetic leakage between the coils, thus controlling the amount of current. Such a device just naturally has a low inherent power factor.

In response to the demand for correction of this power factor, a two-lamp ballast was made with a condenser in series with one lamp. The charging current for this condenser is balanced against the magnetizing current for the iron core and a high power factor is the result. Such ballasts are normally for two lamps each, although power factor corrected ballasts are now also available for single lamps and for three or more lamps.

Hum and Flicker

In order to reduce heat losses due to currents circulating in the iron cores of alternating current devices, including ballasts, the cores are built up of laminations. Even where these are skillfully assembled, there is likely to be a perceptible hum. This is because of the vibration of the laminations due to the alternating magnetic field. At one time this hum in ballasts was quite objectionable. The construction has been perfected today, however, to the point where the hum is greatly reduced in all good ballasts. Some ballasts are even rated for a low degree of noise and are furnished on this basis.

All alternating current passes through zero at the instant it changes from one direction to the other (each half cycle). Since an incandescent lamp is merely a "heated metal filament or wire in a bottle," the temperature of the filament due to the accumulated heat is nearly constant. The light emitted is therefore also so nearly constant that no variation is visible to the eyes. This is at 60-cycle frequency —and when operated on a 25-cycle system there is a noticeable variation and this is called stroboscopic flicker.

In the fluorescent lamp, the current passing through the tube sets up a high frequency radiation. This in turn bombards and agitates the phosphor powder coating on the inner surface of the tube. This causes the phosphor to glow and to emit light. At the instant the current is zero, there is no bombardment and, were it not for some phosphorescent carry-over, the light would go out completely for that instant. Condensers in multiple lamp ballasts also help by assuring that the current passes through zero at

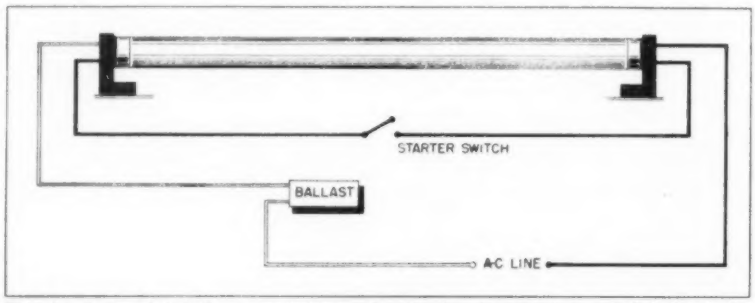


Fig. 4. A simplified fluorescent lamp circuit, showing an iron-cored ballast for current control and a short-circuiting starter switch to permit a pre-heating current to flow. Opening the switch (automatic in practice) subjects the tube column to full voltage between heated cathodes, this voltage being supplemented by an "inductive kick" from the ballast which is due to the current interruption

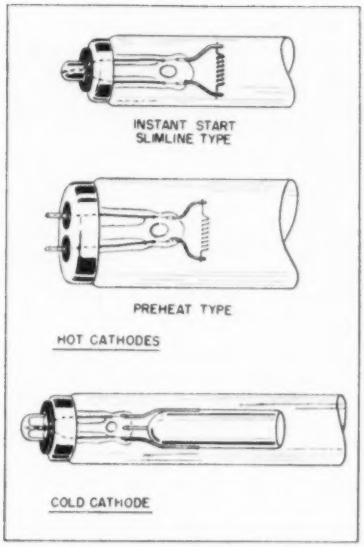


Fig. 5. Typical hot and cold cathodes. Some bipin lamps are used on instant-start ballasts, the pins then being connected inside the lamps. Even with less energy required for starting, the fine wire hot cathode temperature increases to a much higher value than does that of the large cold cathode thimble, thus facilitating re-starting.

different times in the several lamps. This eliminates the stroboscopic flicker to the extent that it is no more noticeable than from an incandescent bulb.

Starting Fluorescent Lamps

The ballast has still other functions. One is to help start the lamps. The discharge between the cathodes (extensions into the tube by means of which the current enters and leaves the lamp) will not start at the ordinary operating voltage. The higher voltage required is provided in one of two ways.

Before the discharge starts, no current is flowing and none of the magnetism in the core is forced to leak between the coils. The design can then be such that this "open-circuit" or no load voltage is high enough to start the discharge instantly. This is called a "cold cathode" start and is employed by cold cathode lamps, and for the initial starting of slimline and instant starting fluorescent lamps.

The discharge will start at a lower voltage from a heated cathode than from a cold one. So arrangements were made to permit an initial current to flow through fine wire cathodes by means of an automatic "starter" switch. (See Figs. 4, 5 and 6.) When this switch opens and interrupts the current, a higher than normal voltage is induced which is ample to start the discharge between the now heated cathodes. This is a "hot cathode" start. Each time the current passes through zero, the discharge stops. However, the cathodes, being heated by the current which has been flowing through the lamp, restore the discharge immediately.

There are two types of hot cathode lamps which, however, are similar in that the cathodes are of a fine coiled wire on which a heavy coating of emissive material is deposited. Most of the bipin lamps need "starter" switches and start as indicated above. Single-pin hot cathode lamps, known as slimline, and instant-start bipin lamps, are first started with cathodes cold, without preheating, by a high open circuit voltage. Then, with the fine wire cathode being heated by the passing of the current, these lamps also re-start each half cycle with cathodes hot and with the expenditure of very little energy. Typical cold cathodes are large thimbles of metal and thus never get hot enough to help, even in the re-starts.

It is thus seen that hot cathode lamps are those with fine wire cathodes, heavily charged with the emissive material, which first start either cold or by pre-heating but re-start hot during operation. Cold cathode lamps have large cathodes, also coated with emissive material, which remain too cool to assist even in re-starting.

Hot and Cold Cathode Lamps

There is a considerable difference in the operation of these hot and cold cathode lamps. Since considerable electrical energy is required each half-cycle to start the cold cathode lamps, they cannot be quite as efficient as otherwise similar lamps with hot cathodes. For the same reason, odd as it may seem, more heat is generated at the cold (lower temperature) cathodes. This situation has been compared with making toast with a high temperature toaster or at a low temperature coal fired range.

A more important difference between the lamp types is in the range of current possibility. The largest hot cathode lamp (100-w) is rated at 1.52 amp (1520 ma or thousandths of an ampere). A considerable amount of energy can therefore be introduced into this lamp. The lowest current hot cathode lamp is rated at 120 ma. Should the current be much less than 120 ma, the lamp will fail to operate satisfactorily, although circuits using separate cathode heating from the ballasts are now being made available which will permit dimming almost to blackout.

Cold cathodes, on the other hand, apparently cannot handle much higher than 200 ma successfully—the usual currents are 50 or 120 ma. However, they can also operate at very low currents and hence are adaptable to dimming. But it is obviously not possible to secure as

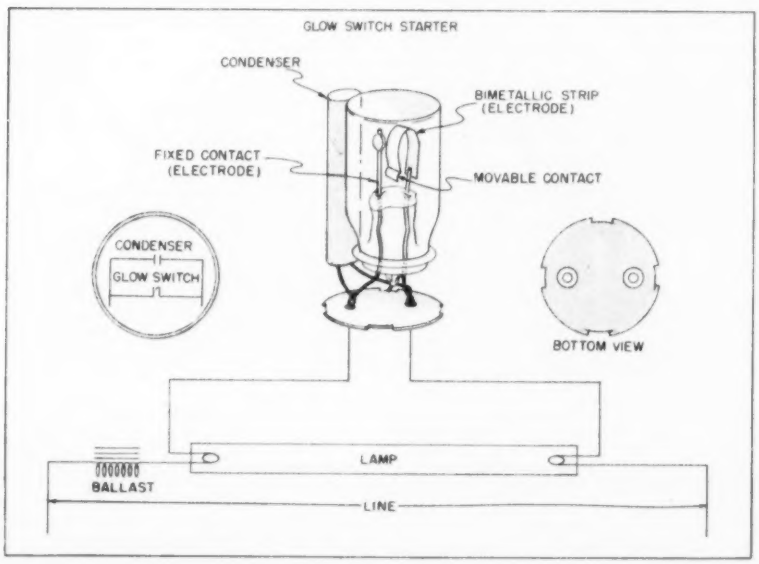


Fig. 6. A typical glow-switch starter. When line switch is closed and voltage is impressed on starter, through the cathodes, neon in the bottle glows and heats the bimetallic strip. This strip expands and makes a contact, permitting the pre-heating current to flow through fine wire cathodes. The closed contact short circuits the neon gas discharge, the gas cools and the switch contact opens. After the lamp starts, voltage across the switch (and lamp) is reduced, by a drop in the ballast with the lamp current flowing, to the correct value for the lamp. This value is too low to cause a current to flow through the starter gas and the contact there remains open. The voltage drop across a very old lamp may be enough to activate the starter switch and the customary cutting in and out of the lamp results. Some starters are provided with another thermal unit, activated by the lamp current when it is trying to start. The accumulated heat after several tries causes this unit to open the switch circuit — stopping all operation of the lamp. When a new lamp is installed, this extra thermal cut-out is re-set for the next operation

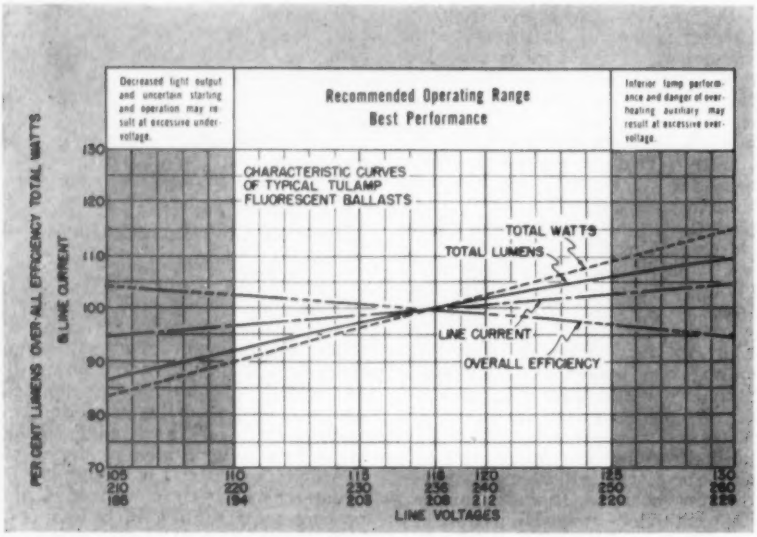

Decreased light output and uncertain starting and operation may result at excessive undervoltage.
Recommended Operating Range
Best Performance
Inferior lamp performance and danger of overheating auxiliary may result at excessive overvoltage.
CHARACTERISTIC CURVES OF TYPICAL TULAMP FLUORESCENT BALLASTS
TOTAL WATTS
TOTAL LUMENS
LINE CURRENT
OVERALL EFFICIENCY
PER CENT LUMENS OVER-ALL EFFICIENCY TOTAL WATTS & LINE CURRENT
130
120
110
100
90
80
70
105 110 115 118 120 125 130
210 220 230 236 240 250 260
186 194 208 208 212 220 229
LINE VOLTAGES

Fig. 7. As the line voltage impressed on a two-lamp ballast and lamps is increased or decreased from the rated value of 118, 236 or 208 v, the total watts, lumens (light output) and line current vary in the same direction but not at the same rate. The lumens per watt (over-all efficiency) vary in the opposite direction. The light output from an incandescent lamp also varies in the same direction as voltage, but at about 3 times relative rate as that from a fluorescent lamp

much illumination from them as from the same length of hot cathode lamps.

Slimline, cold cathode and instant-start fluorescent lamps operate on ballasts delivering 450 to 750 volts. To avoid possible danger here, it is required that the line wire to the transformer-ballast pass through a lamp holder in such a way that the transformer cannot be activated when a lamp is being removed or inserted or is entirely out of the fixture.

The question of the relative life of hot and cold cathode lamps is one frequently discussed. There seems to be little doubt but that the latter have a longer average life.

With hot cathode lamps rated for 6,000 to 7,500 hours life and frequently lasting much longer*, the real question seems to be whether it is economical to continue to burn "tired, old lamps" of either type, delivering perhaps three-fourths of their rated light output per watt consumed. The cost of the lamps is a small part of the cost of the light —might this operation be "saving at the spigot and losing at the bunghole"?

With the life of each type so very long, this is not an important economic factor, particularly when substantial savings in labor are realized through group replacement. Under these circumstances, significant economic facts, such as efficiency and light output per foot of tube, and important lighting facts, such as relative brightness, should be given major consideration in choosing between these sources.

*Several years ago, the writer inspected several hot cathode lamps which had lasted 14,000 hours and would still light normally. They had been turned off but once during that time.

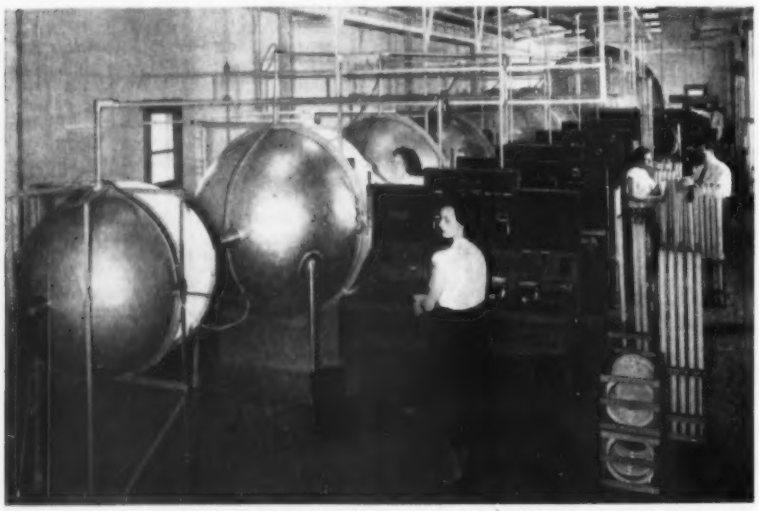


Fig. 8. While the light output from a fluorescent lamp is measured in a photometric sphere, electrical characteristics are also observed. Samples are selected for quality tests and for life tests, but all lamps are inspected in production

Possible Hazards Avoided

There are two forms of radiation in connection with fluorescent lamps. One is of very high frequency caused by the discharge of current through the rare mercury gas in the tube. The other is the visible radiation or light of various colors emitted from the phosphor powders, plus a small amount of blue-green light from the gas (similar to that from the mercury vapor or older Cooper-Hewitt tubes).

The high frequency, short wave length, radiation is invisible and is contained within the common glass tube, which is opaque to this radiation. This is fortunate because that radiation would be harmful to the eyes. Some people, who knew about the radiation but not about the glass, were concerned about possible danger until the American Medical Association investigated and pronounced the lamps as safe. A special type of glass is substituted in making germicidal lamps, which permits the high frequency radiation to pass through for the destruction of bacteria. The eyes should not be exposed to germicidal lamps.

Certain of the ingredients, used at first in making the phosphor solutions for the inside of the tubes, were of a type which introduced a possible health hazard under special conditions. This gave some concern on general principles. Other ingredients were found and substituted several years ago. The incident is mentioned merely to re-assure any readers who may have heard comments on the subject.

No glass articles should ever be destroyed carelessly and this applies to fluorescent and incandescent lamps as well as to any other devices. Where many units must be destroyed, enclosures in which to break them up, without direct contact by the hands, should be provided.

Fluorescent lamps and their accessories have been perfected to the point that very little trouble is now experienced in their operation. The lamp manufacturers have provided operating specifications for ballasts and starters which will assure the proper operation of the lamps. Field engineers advise that any trouble is usually due to the use of non-certified accessories.

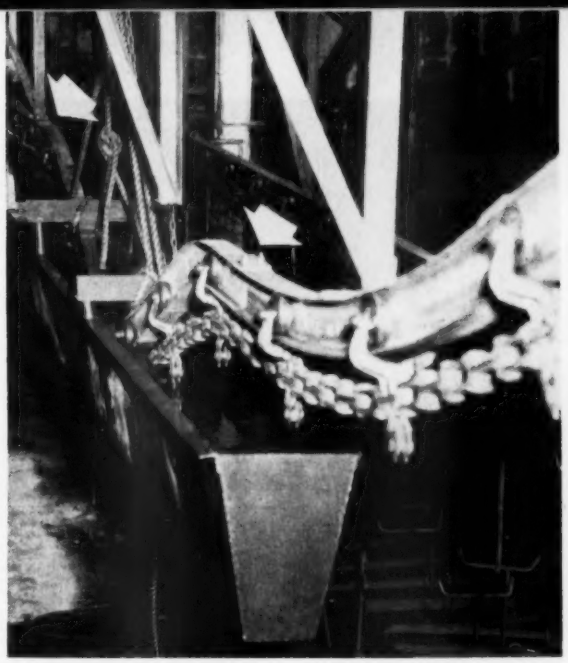
To Be Continued

The second article in this series of two will appear in the March issue of PLANT ENGINEERING. It will discuss fluorescent lamps further, including the ways in which they are used in modern lighting practice.

Conveyor Chain Takes a Dip— Comes Out Clean

Previous cleaning method required about 80 man-hours for each 1,000 feet of conveyor chain . . . Now, chain dips into the cleaning solution and cleans itself

By **ROBERT B. GILRAY**, Plant Engineer,
Motor Products Corp., Detroit, Michigan



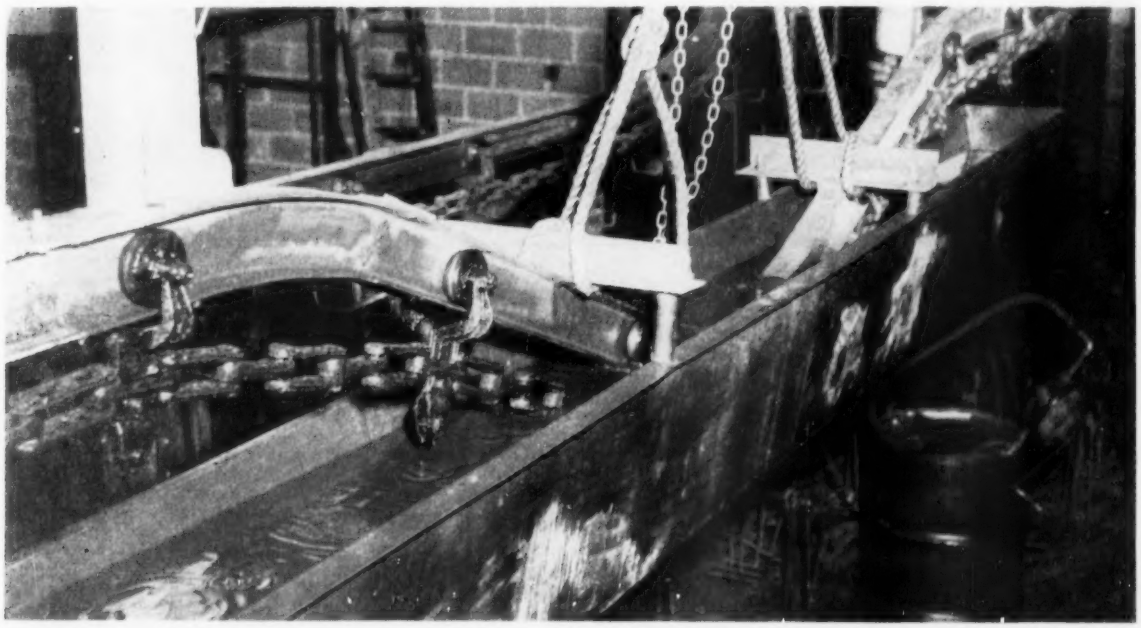
This is one of the two tanks—equipped with its own monorail dip—that is connected (arrows) to the conveyor system

THERE ARE MANY conveyorized painting operations in our plant. Because of this, the overspray even on electrostatic operations must be removed periodically from the conveyor chain and trolleys.

This was formerly accomplished by weekend removal of chain and trolleys, cleaning in a caustic solution, oiling and reinstalling. In order to remove the chain it was necessary to cut the monorail (in most cases, a 4 in. I-beam) and removing the 1,000 ft of chain. The chain was then soaked for approximately 8 hours in a hot caustic solution. After rinsing thoroughly, the chain was then oiled and the trolleys greased. After this, the conveyor was reassembled on the monorail. This cleaning method required about 80 man-hours per 1,000 ft.

The new method is to suspend a removable tank under a dip in the existing conveyor and run the conveyor through the tank. It requires about 20 minutes to install this tank. At two points along the conveyor system tanks have been installed with their own monorail dip. These can be installed in a straight run horizontal removable section in from 30 to 45 minutes.

The tank is filled with a solution of 60 per cent Oleum Spirits and 40 per cent SAE 90 oil. The conveyor is then turned on and allowed to run for whatever period of time is necessary to clean it completely. We have found this method satisfactory with the most stubborn cases in the plant. For example, on one conveyor, which is over one mile long, 8 hours cleaning operation with no supervision.



Close-up view of tank shows how conveyor chain is completely submerged in cleaning solution, containing 60 per cent Oleum Spirits and 40 per cent SAE 90 oil. Conveyor is operated through the solution for time required to clean the chain

Both production and maintenance sawing of non-ferrous metals are speeded with friction sawing due to frictional heat

Friction Sawing—
An Ultra-Fast Means of Cutting Ferrous Metals

By A. M. BERGSON, Engineer, Machine Tool Div., The DoALL Company

THERE EXISTS today an amazingly rapid means of cutting ferrous metals and alloys. Known as "friction sawing," this method affords such rapid cutting that it compels revision of existing concepts as to what constitutes maximum production. Yet for some reason it is not widely known in industry and is looked upon by some as a novelty.

Utilizes Frictional Heat

Friction sawing may be considered a "bandsawing" method in that it requires the use of a saw band and a band machine. However, unlike conventional bandsawing it does not rely completely on the cutting action of sharp teeth. Instead, it utilizes the frictional heat generated between the saw band teeth and the material when the band is moving at very high speeds in the range of 3,000 to 15,000 feet per minute.

This frictional heat raises the temperature of the material directly ahead of the band to approximately forging temperatures at which point it is soft and relatively plastic. Naturally, the teeth bite more easily into the softened material virtually scooping this material from the kerf (saw slot). Because the material is softened it can be seen that tooth sharpness is not a prime factor in cutting rate and a saw band can cut rapidly through the work even with dull teeth.

The friction sawing method, wherein it is desirable to create heat, is in direct contrast to the conventional sawing technique, a relatively low speed method, in which it is desirable to keep the tool and the material as cool as possible for the retention of tooth temper, sharpness and cutting efficiency.

It cannot be denied that sharper teeth provide better cutting action even in friction sawing, but this sharpness, as shown above, is not a critical factor affecting cutting rate. The teeth of a friction saw band, dull or sharp, serve two very important functions. First, they are extremely efficient generators of heat and secondly, they serve to remove the softened material as fast as softening takes place assuring rapid cutting, reducing the amount of feed pressure required, and reducing burr to a minimum.

The teeth of a friction saw are efficient heat generators because they multiply the efforts of the feeding force into the high unit pressures necessary for quick heating. For example, when a saw is in engagement with a piece the feeding pressure applied to the piece is impressed only on those very small areas of the piece that are in contact with the tips of the teeth. If the total amount of area contacted by the teeth is one-fifth of the piece thickness, the effective pressure in terms of work accomplished is then five times the actual feed pressure. Thus, if a feeding force of 30 pounds were being applied against the piece, the effective pressure would be 150 pounds.

Rapid Cutting Essential

In connection with the fast cutting facilitated by the teeth of the friction saw, it is interesting to note that fast cutting is a requisite for effective friction sawing. Too slow a cutting rate allows the heat to penetrate more deeply through the material, ofttimes destroying the desirable metallurgical characteristics of the metal. For example, undue penetration of heat can burn the metal or ruin its temper, or in the case of such alloys as stainless

steel, ruin its corrosion-resisting properties. Where cutting is rapid the point of intense heat moves along so quickly that there is no time for heat penetration to occur. Selection of the proper saw band and operating factors such as speeds and feed pressures can assure this rapid cutting and the minimizing of heat damage to the material.

Friction sawing is not ordinarily recommended for non-ferrous metals because these are free-machining materials that are readily cut in the conventional manner.

The characteristics incorporated into the modern friction saw band are carefully selected to overcome the rigors encountered in friction sawing. As in any hard edge saw band, the teeth must be of extreme hardness for cutting efficiency and wear resistance. This hardness also holds the set tooth more rigidly and affords a more strongly anchored tooth that can better resist the violent impacts encountered with the friction sawing techniques.

It is also necessary to safeguard the flexibility of the band and this quality is obtained through the use of special analysis steel, carefully heat treated to assure long flex life. Gullets are scientifically shaped for fast removal of metal and to prevent jamming of the metal in the gullets. Angle of set of the teeth is carefully chosen and rigidly maintained to provide proper clearance and optimum cutting performance. To maintain these characteristics in friction saw bands, the degree of quality control exercised in their manufacture is probably greater than that required in the manufacture of many precision products.

Because of the concentration of heat required for softening the metal, friction sawing is not recommended for materials over 1 in. thick. To clarify this limitation, the dimensions of the object being cut (such as tubing) may be considerably more than 1 in. thick but not more than 1 in. of solid material should be encountered by the saw for effective results. However, thicknesses somewhat over 1 in. can be friction sawed when the "rocking" technique is used. With this technique the material is rocked against the saw band so that there is less than 1 in. of solid material in engagement with the saw band at given moment.

Within the range of thicknesses covered by friction sawing, cutting rates are unbelievably high, even on such hard-to-machine alloys as stainless steel. For example, carbon steel No. 1050-1095 (SAE) 1 in. thick can be cut at the rate of 6 in. per minute. On ferrous sheet metal the friction saw band literally races through the material, cutting faster than a man can feed by hand. Sheet steel $\frac{1}{16}$ in. thick, for example, can be cut at the rate of 140 linear feet per minute.

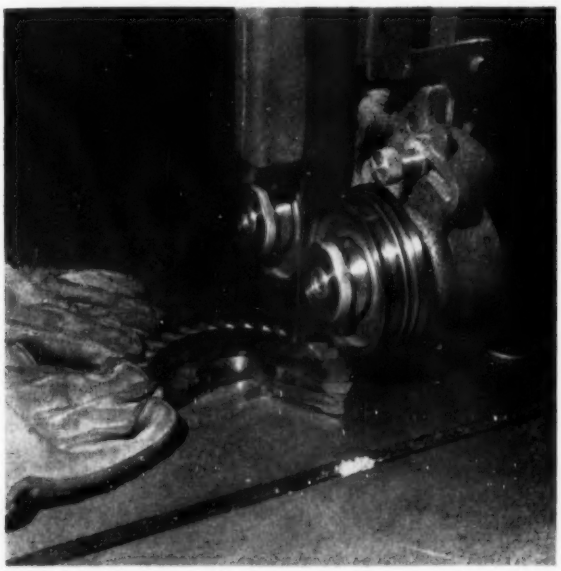
Friction saw band cuts through steel even harder than the band itself. It cuts easily such items as files and milling cutters, sometimes faster than conventional saw bands can cut through softer, less tough materials. Friction sawing is ideal for straight cutting and lends itself admirably to very high production cut-off work. One manufacturer using a fixture, is cutting manifold tubing at a rate of one cut per half-second.

Operating factors employed in cutting various ferrous metals of different thicknesses. Cutting rates that are to be expected are shown in right hand columns

MATERIALS	Saw Velocity Work Thickness			Saw Pitch Work Thickness			Approx. Lin. Cutting Rate (in./min.) Work Thickness				
	$\frac{1}{16}$ - $\frac{1}{4}$"	$\frac{1}{4}$" - $\frac{1}{2}$"	$\frac{1}{2}$" - 1"	$\frac{1}{16}$" - $\frac{1}{4}$"	$\frac{1}{4}$" - $\frac{1}{2}$"	$\frac{1}{2}$" - 1"	$\frac{1}{16}$"	$\frac{1}{8}$"	$\frac{1}{2}$"	$\frac{3}{4}$"	1"
Carbon Steel (S.A.E.) #1010-1095	6,000	9,000	12,500	14	10	10	1400	60	30	8	6
Manganese Steel #T1330-1350	6,000	9,000	12,500	14	10	10	1200	55	25	7	5
Free Machining Steel #X1112-X1340	6,000	9,000	12,500	14	10	10	1400	60	25	7	5
Nickel Steel #2015-2515	8,000	12,000	14,000*	14	10	10*	800	45	20	5	3
Nickel Chromium Steel #3115-3415	8,000	12,000	14,000*	14	10	10*	800	45	18	5	3
Molybdenum Steel #4023-4820	8,000	12,000	14,000*	14	10	10*	1000	50	20	6	3
Chromium Steel #5120-5150	8,000	12,000	14,000*	14	10	10*	800	45	18	5	3
Chromium Steel #51210-52100	8,000	12,000	14,000*	14	10	10*	800	40	15	5	3
Chromium Vanadium #6115-6195	8,000	12,000	14,000*	14	10	10*	700	40	15	5	3
Tungsten Steel #7260-71360	8,000	12,000	14,000*	14	10	10*	600	38	12	4	3
N. E. Steel #8024-8949	8,000	12,000	14,000*	14	10	10*	800	45	20	6	3
Silicon Steel #9255-9260	8,000	12,000	14,000*	14	10	10*	600	45	16	4	3
Armor Plate	7,000	10,000	13,500	14	10	10	1200	60	30	6	5
Stainless Steel	7,000	10,000	13,500	14	10	10	1200	60	30	8	6
Illium	8,000	12,000	15,000*	14	10	10*	600	35	12	3	2
Cast Steel	7,000	10,000	13,500	14	10	10	1000	50	16	7	5
Gray Cast Iron	7,000	10,000	13,500	14	10	10	1000	55	20	7	5
Malleable Cast Iron	7,000	10,000	13,500	14	10	10	1000	55	20	7	5
Meehanite Castings	7,000	10,000	13,500	14	10	10	1000	55	20	7	5

* Use Rocking Technique on Maximum Thickness.

Splitting a milling cutter. The friction saw band can cut materials harder than the band itself due to frictional heat



Friction sawing is adaptable to ferrous foundries where it provides an ultra fast method for removing gates and risers

CHEMICALS as Tools in Plant Maintenance

By H. NYE JOSLEYN

SOME UNDERSTANDING of the safe use of ordinary chemicals as tools in plant maintenance can save time and money on many jobs.

Inhibited acids have a wider and more flexible application than uninhibited acids. Inhibitors are chemicals which, added to other chemicals, allow stronger solutions to be used to speed up the time of action without damage to the metal. They may be purchased with instructions at a low cost from any of the larger supply houses in quantities of from one gallon up. A few ounces added to a 100 lb carboy of hydrochloric acid is sufficient to allow a wider and less critical range. Following are some practical plant uses of readily obtained chemicals.

Hydrochloric Acid. Slippery floors of concrete, brick, or aggregate are roughened up by spreading the pure acid over wet floors that have been previously scrubbed with a detergent. Use a rubber squeegee, or stiff fiber long handled brush. After twenty minutes flush the floor with clear water. The use of rubber overshoes, rubber aprons, and goggles is advisable.

Clean tile walls with a solution of one part acid to three parts water. Apply with fender brushes out of small pails to cut down spattering and for ease of handling. Rinsing is not necessary. While this strength acid is not considered harmful it should be washed off the skin with little delay.

Remove scale from the working surfaces of ice making machines, without injury to the metal. For a fifty ton unit, add two gallons of inhibited acid, or one gallon of pure acid, to the normal amount of circulating water carried just under the overflow level. Circulate for twenty minutes, drain, and flush out with clean water until the water shows clear. The machine must be at room temperature during the cleaning operation. To assure clean ice when starting up, the machine should be started immediately.

Clean moderately dirty toilet bowls with two ounces of the acid poured into the water. Swab about thoroughly and rinse.

Scaled up valves or pipe are readily cleaned with either pure or inhibited acid. Rinse with plenty of water. Hydrochloric acid spattered on the skin should be rinsed off immediately with clean water. Wear goggles.

Potassium Permanganate. Trace sewer lines and drain water by dyeing the water a strong purple. Use one ounce of the readily soluble crystal dissolved in one gallon of warm water, or trickle the crystals directly into the drain.

Carbon Tetrachloride. Carbon tetrachloride is a rapid cleaning solvent for gums, oils, greases, rubber cement, and tar. A limited application of this chemical will kill rats and insects in densely packed partitions or under ground.

In drying out electrical coils and parts it has a strong affinity for water, dries rapidly, and is nonconducting.

It can be used as a drier and hardener for paint as well as a fast drying thinner for the corrosion-resisting greases which are applied to the inside of condenser water heads and tanks.

Carbon tetrachloride is readily obtainable in the handy one quart refills for types of fire extinguishers. Because the fumes are dangerous use only in well ventilated areas.

Rock Salt Residue. Holes in hard-top roads can be permanently filled with the heavy sand residue removed from the bottom of rock salt brine mixing tanks. Once in place this filler will settle down hard and not shift.

Sodium Silicate (Water Glass). To dust proof and bind dry cement factory floors use a solution of 50 per cent water and 50 per cent sodium silicate. Mop over thoroughly and rapidly.

A smooth appearing surface on canvas-finished pipe covering is obtained by painting with two coats sodium silicate diluted with 25 per cent water. Add a little red or green paint, two ounces to the gallon, so that the otherwise clear, almost invisible, sizing can be seen where it is being applied.

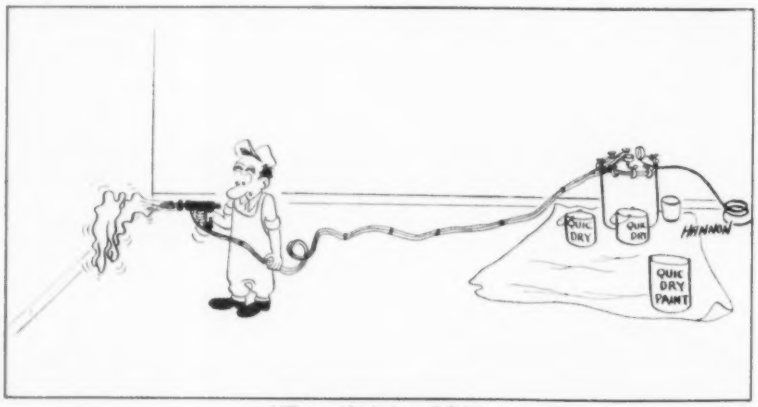
For sticking shipping labels to wooden boxes undiluted sodium silicate is widely used as a waterproof glue.

Filling leaking cracks in cement floors and ceilings with slightly diluted sodium silicate often accomplishes satisfactory results when other methods fail. Use two to four applications, allowing time for hardening between each pouring.

Wear goggles when painting with these preparations. Wash spatterings off the skin with clear water.

Phosphoric Acid (H3PO4). Remove heavy coating of rust from machinery or installed pipes by painting on a saturating coat of the pure acid. After a twenty-four hour period rinse off with water. This leaves a corrosion resisting coat of basic iron phosphate on the exposed bare metal that is an excellent base for paint. Wear rubber gloves and goggles.

Caustic Soda (Flaked). Cleaning of tank cars, used for edible solutions, of accumulated grease or other contaminations, is accomplished by boiling out with a strong solution of caustic soda and water. Boil overnight with steam in the heating coils in the bottom of the tank. Flush out with water. In extreme cases follow up by cleaning



"Boy—that is quick!"

with wire brushes. Lay the manhole cover loosely on the opening when boiling out to keep caustic from spattering on unwary persons.

In cleaning a 4 in. floor drain plugged with grease or food products, pour two to five pounds of the caustic into the drain, add hot water slowly. The addition of hot water to flake caustic soda gives a violent physical as well as chemical reaction. Caution—add the hot water through a length of hose that will allow persons to keep a distance of at least twenty feet away from the drain.

Caustic soda is as dangerous to the skin as a strong acid. In handling, wear goggles, rubber footwear, gloves and apron.

Calcium Chloride. This economically priced chemical, useful in all seasons, is generally considered harmless except for some corrosive tendency and inedibility. The corrosion factor is controlled by the use of one pound of sodium dichromate to sixty gallons of calcium chloride brine.

For the curing and quick setting of concrete in low temperatures add ten per cent of calcium chloride to the dry mix.

To keep wooden fire protection tanks from freezing, mix twenty pounds of calcium chloride to five gallons of water for temperatures down to minus 45 F. Fifteen pounds to five gallons of water will give protection down to minus 10 F.

Keep spray type unit cooler coils, under low temperatures, free from ice by using a calcium chloride brine with an inhibitor of sodium dichromate.

Ammonium Hydroxide (household ammonia). Remove offensive odors from rooms, rapidly and harmlessly, by flushing the floor with ammonia water. Close up the room for ten minutes followed by good ventilation. The odor of ammonia rapidly disappears.

Clean window glass with a solution of one-third pint of ammonia to one gallon of warm water. Ordinary dirt is easily removed and a sparkle is added to the glass.

Ammonium hydroxide obtained as a by-product waste of purging ammonia refrigeration systems is considerably stronger, and therefore preferable, to the regular commercial product.

Prussian Blue. For refinishing gun metal or acid blued turbine or steam engine parts, paint with a thin, even-flowing solution of lacquer, or clear shellac, colored sparingly with the prussian blue regularly used in fitting bearings.

Kerosene. When mopping painted engine room floors, add one-third of a pint of kerosene to the regularly used soap and water to aid in removing old oil and grease. A shiny non-streaked finish will be obtained that will simplify future cleaning.

Welding Idea For Hardened Parts

CERTAIN OPERATIONS in the welding department at Carborundum Company, Niagara Falls, N. Y., call for the attachment of hardened steel bars or similar pieces to other steel parts. Due to the fact that steel shrinks in the hardening process difficulties were encountered in the past. Holes that were drilled in the steel before the hardening process took place were pulled out of line. This made the assembly of two parts a difficult job of drilling, tapping, shaping and even fastening with cap screws to insure a perfect fit of the component parts.

Now, thanks to a suggestion made by Frank Lancaster, welding technician in Carborundum's welding department, the company has developed a new technique for taking care of problems of this nature. Mr. Lancaster reasoned that if certain desired areas of low carbon steel —such as SAE 1020, 1030, etc.— could be retained in their original soft state through the hardening process it would be a much simpler job to machine, drill, tap and weld.

So, Mr. Lancaster experimented and found that by welding a layer of 18.8 or other austenitic stainless (or a plate of the same material) over the desired area that it could be held in its original state.

The weld or plate should be ground off if machining is to be performed after hardening. If welding is to be done instead of machining, it will not be necessary to remove the pad or plate inasmuch as all welding can be done directly on it. This procedure is always more satisfactory than welding directly onto the hardened section; welding should be done before carburization.

Welding Technician Frank Lancaster of Carborundum's welding department displaying hardened steel part with overlay of stainless steel (arrow) which maintains steel in its original soft state throughout the hardening process. Result: Easier to machine, drill, tap and weld

Suggestion Committee Supervises Kodak's Suggestion Plan

Kodak's suggestion system was started in 1898 . . . Since then, over 100,000 suggestions have been approved . . . The suggestion plan has been very successful through careful supervision of the plant suggestion committee

By E. WELLER

ONE OF the oldest Suggestion Systems in America is that at Eastman Kodak Co. of Rochester, N. Y. It was established in 1898. Since that time, over 100,000 formal suggestions have been approved and the Suggesters paid more than a million dollars in awards. These suggestions have resulted in improved operations and better working conditions in Kodak's plants. In 1951 alone the company paid $241,-063.50 for accepted suggestions, an all-time-high record. There were 43,059 ideas submitted for this year, the greatest number for any year since the system was started.

There are 5 Eastman plants in Rochester — Camera Works, Naval Ordnance Division, Distillation Products Industries Division, Kodak Park, and Hawk-Eye. Each of these plants has its own suggestion system which is in charge of a full-time secretary. While the administration is decentralized, the over-all plan is generally the same for each. Plant committees range from 6 to 10 members, drawn from upper supervision of representative departments within the division. These committees meet every 4 weeks.

The main requirement of each suggestion plan is that it be so developed that its success depends largely on orderly administration and procedures. The plan must insist on:

1.—Prompt dealing with suggestions.
2.—Awards being equitably and logically determined.
3.—Rejections being clearly explained to a Suggester.
4.—The constant publicizing of the suggestion system to encourage continued participation by employees.
5.—Supervisory interest and encouragement.

How System Operates

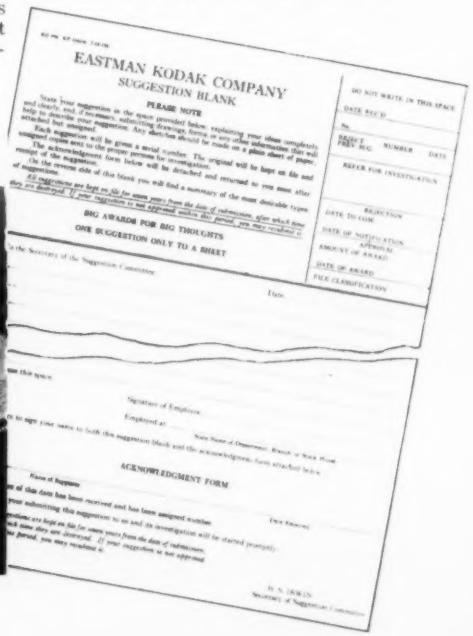
In actual operation, suggestion blanks are made readily available to each employee and, after filling these in, the Suggester may place them in the plant mail or in boxes provided throughout the plants for this purpose. Suggestions are delivered to the suggestion secretary and promptly acknowledged. If for some reason the Suggester does not care to place his name on his suggestion, he may watch a bulletin board where the number which was on his blank will be posted if his suggestion is accepted.

After receiving and filling the blanks, the secretary submits each suggestion to those members of management and the staff groups whom he believes to be the best qualified to pass upon the suggestion. It may be necessary to put the suggestion to a trial test or do considerable research on it before its merits can finally be decided upon.

After all reports and comments on the suggestion have been reviewed by the plant suggestion committee or the secretary, the suggestion is then either approved or rejected. Award lists are made up in each plant every 4 weeks, and checks are sent out to department heads and superintendents for personalized distribution to successful Suggesters.

At one of the plants a definite formula for calculating the award is used: Twenty-five per cent of the tool cost is subtracted from the estimated gross savings for the first year. This results in an estimated net savings, and 25 per cent of the amount is paid as the award. One-half of the award is paid at the time of approval; at the end of the year, after the actual savings are calculated, the balance is paid.

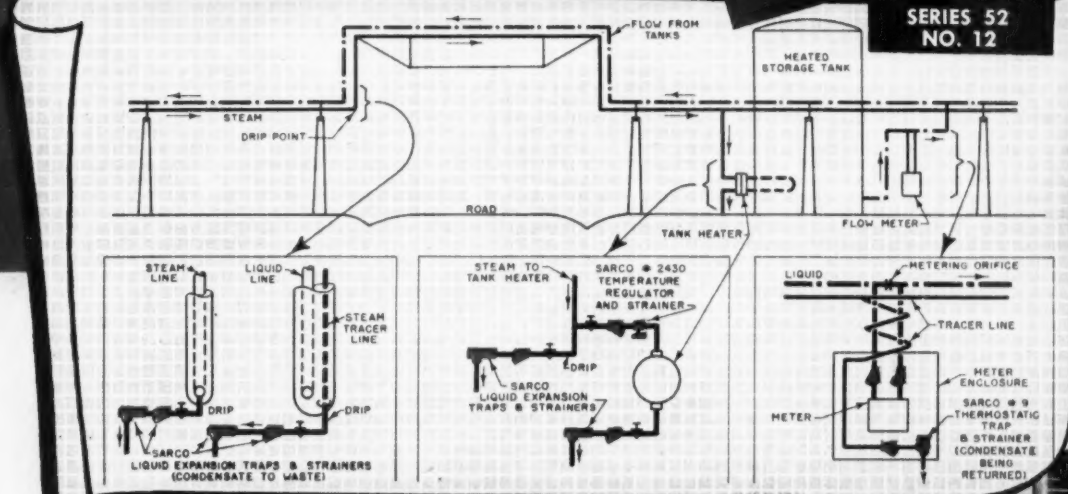
At another company plant about 10 per cent of the first year's gross savings is used as a guide to determine the award. At the end of the first year, the suggestion is reviewed. If it appears that the initial



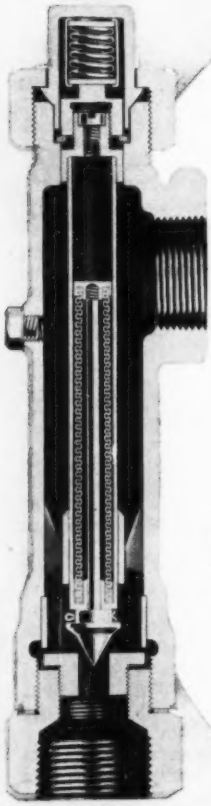
The suggestion committee meets every 4 weeks to consider suggestions and to discuss recommendations for cash awards. Here the committee considers a suggested change in metal equipment on a spooling lathe. The equipment can be seen on the table

Steam Trapping OUTDOORS

SERIES 52
NO. 12



Trapping outdoor storage tank heaters, tracer lines and steam mains with Sarco LIQUID EXPANSION thermostatic steam traps.



Sarco No. 871 LIQUID EXPANSION thermostatic steam trap for outdoor applications. Discharges condensate in a continuous stream at temperatures always below 212°F.

Have you the problem of removing air and condensate from outdoor storage tank heaters, tracer lines and mains?

Sarco, and Sarco alone offers you a special LIQUID EXPANSION thermostatic steam trap designed especially for this type of installation.

The Sarco LIQUID EXPANSION thermostatic steam trap has these advantages:

1. Needs no protection against freeze ups.
2. Discharges condensate at adjustable temperatures below 212° F., making it possible to use some of the sensible heat of the condensate.
3. Small size, light weight, large capacity — as easy to install as a pipe elbow.
4. Not affected by water-hammer, vibration, pressure pulsations or superheat.
5. And just as effective indoors too.

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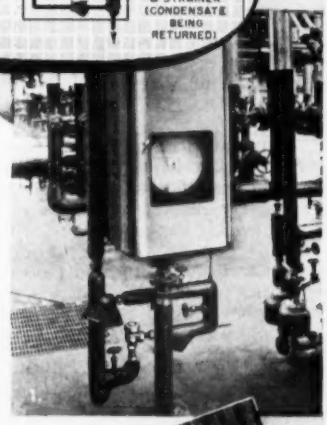
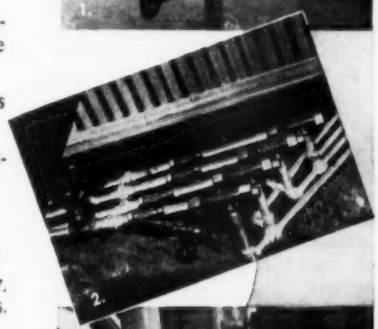
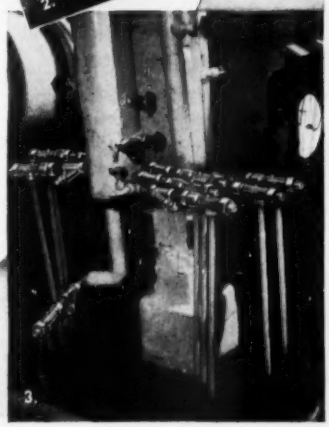


1. Removing air and condensate from coil heaters in flow meter cabinets with Sarco No. 9 balanced pressure thermostatic steam traps.
2. Steam jacketed asphalt lines and a jacketed pump drained by Sarco No. 871 LIQUID EXPANSION steam traps. (Globe Roofing Products Co. Whiting, Ind.)
3. Sarco No. 871 LIQUID EXPANSION Steam Traps draining air and condensate from steam tracing lines.





SARCO saves steam
improves product quality and output 416

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A Good Suggestion System Offers These Benefits:

1. A well operated suggestion system contributes to good morale as it is a means for individual self-expression, with the assurance that all suggestions will receive careful attention from someone qualified to consider them.

2. It means equitable awards for worthwhile ideas which do not interfere with a wage plan based upon job evaluation.

3. It furnishes an additional supervisory means for developing a spirit of intelligent cooperation.

4. Through it, talent may be discovered by management which might otherwise not be recognized.

award was too small, an additional award may be paid. At the same time, the potential second year's savings are taken into account and may include a percentage of the estimated saving. No maximum is in effect at any of the Kodak plants.

Suggestions such as safety measures, which are not so easily evaluated, are considered and awards made on the basis of staff or other qualified advice.

In some large departments there are departmental suggestion committees whose members are selected from departmental supervision and who review all suggestions relating to that department's operations. These committees study and pass on suggestions from their own departments before they are relayed back to the plant suggestion office for final decision.

About a third of all suggestions offered are approved. When awards are large, members of top management often make the presentation of the check personally as an indication of their appreciation of the Suggester's effort and cooperation in submitting a particular suggestion.

When it is decided that a suggestion is not usable, the Suggester is informed of this fact in writing and a complete explanation is made of the rejection. This policy has done much to encourage disappointed Suggesters to try again as they appreciate the keen interest thus shown by management in an employee's efforts.

Mutual Benefits

Experience has shown that the best reward for an approved suggestion is cash, but aside from the monetary benefits, the suggestion system has resulted in other important benefits for both company and employees.

The whole system must operate on the assumption that each employee, being in close contact with his particular job, will develop ideas relating to that job. To put these ideas into the form of suggestions is only the next logical step. Some employees turn in many suggestions, others only a few. Some men and women need encouragement before the first suggestion is submitted. but whatever the conditions, all members of management and first-line supervision in particular, welcome all suggestions and are glad to render any assistance or advice requested by an employee regarding suggestions. This sympathetic cooperation of management has done much to give the company the successful suggestion system it has enjoyed for these many years.

Kodak has no defined limits for the types of suggestions which may be submitted, but it does encourage some specific kinds: new products and new applications of existing products; improved quality of products; reduction in costs or elimination of waste; improvement in methods and processes, tools, equipment, working conditions, packaging and labeling materials and supplies, schedule procedures, waste recovery and use of by-products; unusual contributions to the solution of any operating problems or difficulties; safety precautions and devices, and conveniences.

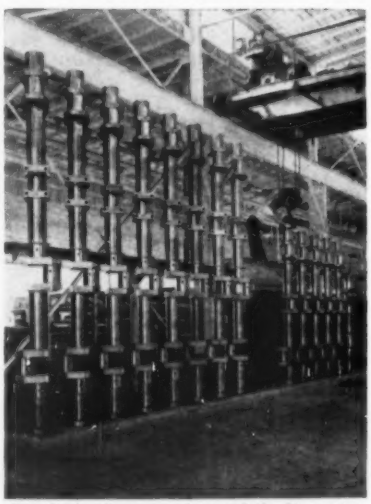
The company suggestion system fits well into the over-all industrial relations program as a natural corollary and supplement to company policies of wage payments, promotions, freedom of discussion with management and general employee-company cooperation. Mismanagement of the system could lead to misunderstandings and dissatisfaction which might outweigh benefits. However, the committees and secretaries keep the system functioning to the entire satisfaction of management and employees alike.

Vertical Storage of Crankshafts Saves Space

WHERE STORAGE area is at a premium, careful planning can simplify or eliminate warehousing handling. Such was the case at the Cooper-Bessemer Corp., Mount Vernon, Ohio. Fifteen hundred square feet of warehouse space that would have been normally needed to store finished crankshafts has been cut to merely 300 sq ft, saving 80 per cent of the floor area for other essential use.

The saving in space has resulted by simply stocking the crankshafts in a vertical position adjacent to a line of columns and away from the more active center section of the main warehouse bay.

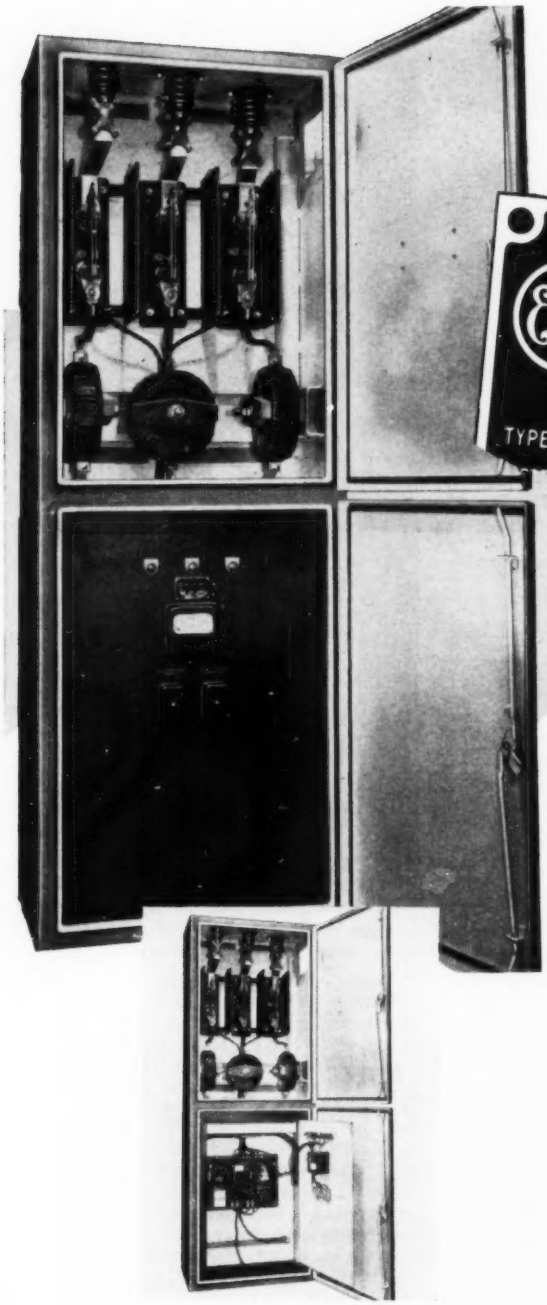
The crankshafts, weighing from 1000 to 6000 lb and ranging in length from 8 to 17 ft, are secured by bolting a flange plate in the floor and tying to a platform with clamps as a safety precaution. A lifting clamp is used on the crane hook to facilitate lifting and handling. This method of storing the crankshafts eliminates any possibility of the distortion of these precision machined shafts.



Vertical storage of crankshafts saves 80 per cent of floor area for other use

The base plate is made from cast iron blocks machined flat and provided with bolt holes to accommodate the different bolt circles on the finished crankshafts. These cast iron blocks are then levelled and grouted to the floor. The platform is steel plate welded to channels that mount on the warehouse columns.

Formerly, it was necessary to coat the shafts with heavy grease and store them outdoors. Because of the floor savings, the new storage system enables these units to be brought inside without taking up a major share of the warehouse's limited facilities. The crankshafts need only be coated with light oil that can be wiped off prior to assembly into the engine crankcase.



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Two views of a 2300 volt EC&M VALIMITOR aligning-type cubicle starter with self-contained bus at top for connecting power to all the starters for this installation. Door interlock provides "*safety*" against opening disconnect switches under load.

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2-WAY PROTECTION with new EC&M Bulletin 1180-3 THERMAL-MAGNETIC Overload Relays. Instantaneous trip ***magnetically*** on short circuits... inverse-time trip ***thermally*** on overloads. Independent snap-action silver contacts for instantaneous and thermal trips help locate trouble when a shutdown occurs.

CONTINUOUS PROTECTION without blind spots is an inherent feature of EC&M VALIMITOR Starters, because the maximum fault current (KVA capability may be infinite) is limited to 25,000 KVA (steady state current) by EC&M VALIMITOR coils. Interruption of the current is by the well-known high interrupting capacity Type ZHS Contactor. No fuses to replace.

UNDER VOLTAGE PROTECTION—When voltage dips or power fails momentarily, motor will re-accelerate if normal voltage returns in two seconds or less. The contactor remains closed down to a low voltage with full spring pressure on the contacts. At about 25% control voltage, the contacts break cleanly—do not stick or burn.

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For more facts circle 557 on Reply Card

Repair Orders Speeded Up with Air

SPEEDY HANDLING of orders, particularly emergency orders for repair parts, was a problem of great concern to the Deming Company of Salem, Ohio.

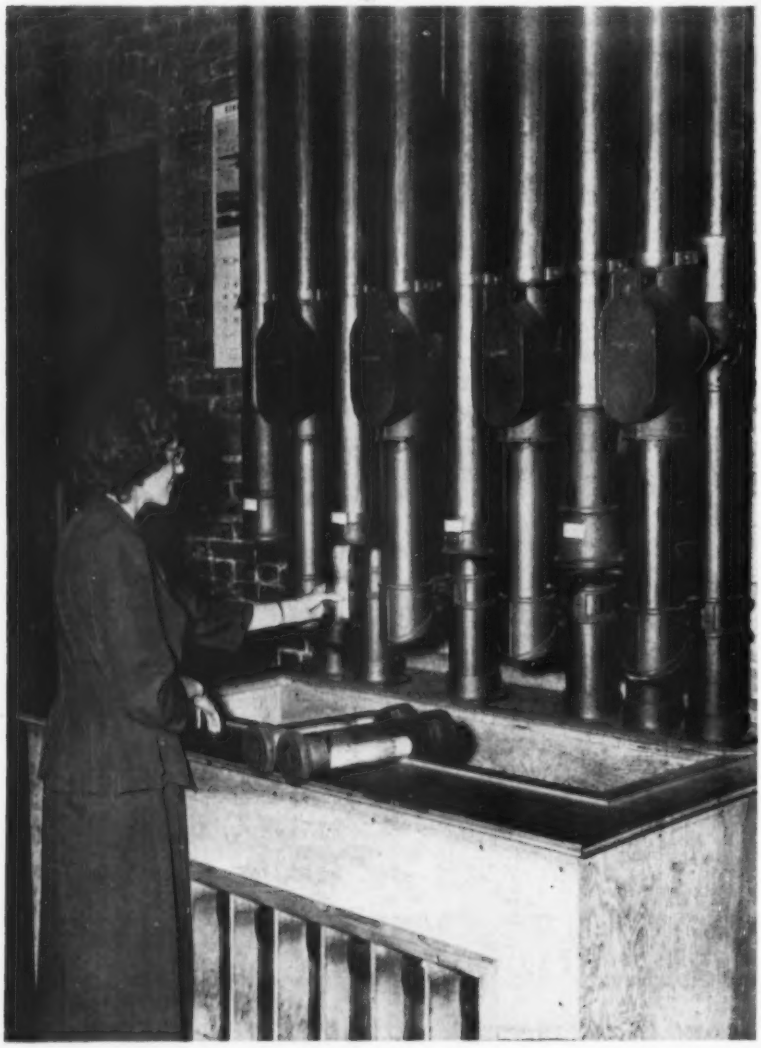
When a pump or water system doesn't function, serious complications can result. Installation of a Lamson Airtube system between the order department in the main office building and the production department across the street, solved many of the problems of speeding up orders. This makes possible getting the pump back in operation without undue loss.

This system runs from the main office building, under the street, beneath the foundry, to the production office where there is a central desk. The production office is connected with the engineering department and two of the sub-assembly departments by separate lines. The system is used to carry orders, invoices, blueprints and even small parts between all points.

Orders were formerly carried by messenger. The messenger made his rounds of the various departments. If orders were ready, he picked them up and carried them to the production office. He could only make one round per hour. As a result, there could be considerable delay in transmittal.

Above: This station is located in the order department in the main office

Below: The central desk in the production office connects with all other stations



Orders for repair and renewal parts come in by letter, wire and telephone. As a result, the fastest possible handling is required. Now, with the new installation, the order is written up soon after it is received. It is then dispatched to the production office where it arrives some 200 yards away in approximately 13 seconds. This has resulted in the plant's being able to ship some urgent repair orders on the same day as received. As a result, good relations with customers have been maintained.

Emergency repair orders are specially marked and handled. The present system also means a reduced sorting problem since smaller batches of orders are transmitted at one time to the production office. The fact that the Airtubes connect the production office with the two departments which handle most emergency parts and repairs means that an order can receive almost immediate attention.

After completion orders are returned to the main office by tube to be turned over to the accounting department for billing. The system also has greatly simplified the use of blueprints throughout the plant.

VU—a popular choice where PERFORMANCE counts the most

It is significant to steam users to know that in virtually every industry, leading companies are using C-E Vertical-Unit Boilers. And it is of even greater significance that with leading *utilities* too, VU Boilers have been a popular choice for many years. For boilers are a major part of the manufacturing operation of power companies and their economy and reliability *directly* affect costs and profits.

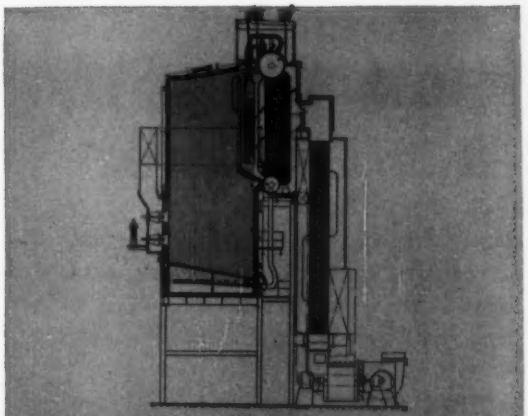
You would expect then that utilities would evaluate boiler design and construction ... exhaustively and critically. And they do. Moreover their buying decisions reflect their experience that the first cost of a boiler is far less important than annual fuel and operating costs. They therefore place special stress on features which will assure the utmost operating economy consistent with reliability.

That they find such features in Vertical-Unit Boilers is evident from the record. Leading utilities from coast to coast have bought VU Boilers and have reordered them again and again. In fact, 54% of all utilities now using VU Boilers have two or more of them in service.

You too can discover as leading utilities have that Vertical-Unit Boilers will give you that day-in-and-day-out economy and reliability essential to a maximum return on your boiler investment. VU Boilers are available for capacities from 10,000 to 350,000 pounds of steam per hour and are adaptable to any fuel or method of firing.

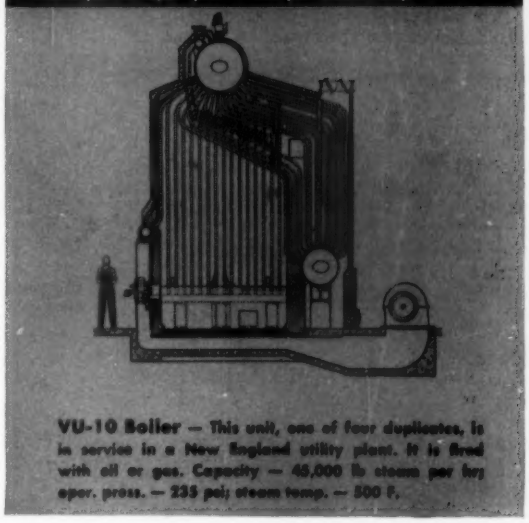
Partial List of Utility Companies Using Two or More VU Units

Atlantic City Electric Co.
California Electric Power Co. • Central Hudson Gas & Electric Co.
Central Illinois Public Service Co.
Dallas Power & Light Co.
Dayton Power & Light Co.
Florida Power & Light Co. • Interstate Power Co.
Kansas Gas & Electric Co.
Missouri Power & Light Co.
Narragansett Electric Co., The • Northwestern Public Service Co.
New York State Electric & Gas Corp.
Omaha Public Power District
Otter Tail Power Co., The
Savannah Electric & Power Co. • Southwestern Public Service Co.
Texas Electric Service Co.
Western Light & Telephone Co.
Western Massachusetts Electric Co.



VU-50 Boiler — This unit, installed in a generating station in Missouri, burns natural gas and oil. It is arranged for future coal firing. Capacity—350,000 lb steam per hr; oper. press.—920 psi; steam temp.—905 F.

VU-50 Boiler — One of two duplicates in a North Dakota station. Fires pulverized lignite, using C-E Raymond Bowl Mills and C-E Type R Burners. Capacity—230,000 lb steam per hr; oper. press.—865 psi; steam temp.—905 F.



VU-10 Boiler — This unit, one of four duplicates, is in service in a New England utility plant. It is fired with oil or gas. Capacity — 45,000 lb steam per hr; oper. press. — 235 psi; steam temp. — 500 F.

C·E

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SELECTION, USE AND CARE OF TOOLS

Pipe Threading Tools – Various dies are discussed for cutting thread on outside surface of pipe and conduit. Article also tells how to use taps for threading the inside surface of fittings

By THOMAS TRAIL, Maintenance Engineer

THERE ARE MANY types of pipe threading dies and die holders (usually called die stocks) available. The simplest type of die is the solid pattern, Fig. 1. This consists of a metal block having threads cut in the center. This die is non-adjustable, and cannot be readily resharpened by the ordinary means. It is used in a non-ratchet square diestock.

Segment dies, Fig. 2, are mounted in a die head in a group consisting usually of four dies. The die head will thus thread one pipe size. These dies are non-adjustable, but they can be removed from the die head for resharpening on a suitable grinding wheel. These die heads are used in ratchet type diestocks.

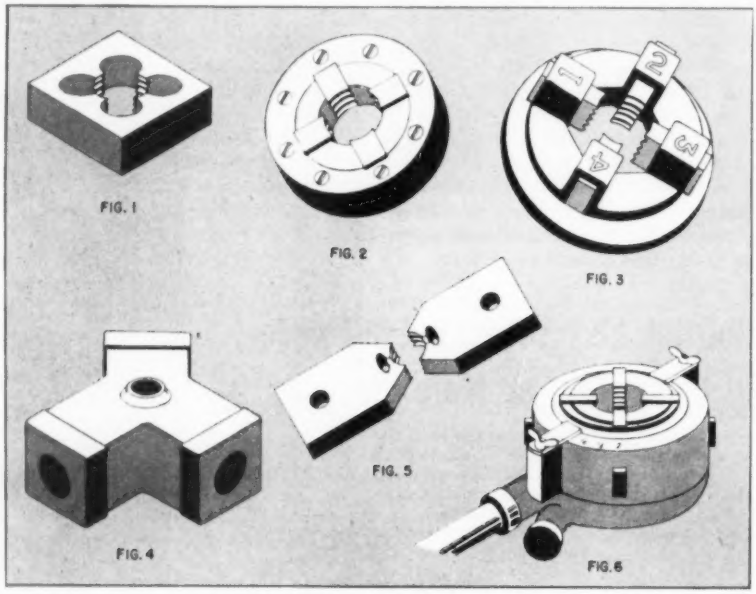
In the lower priced types, the body of the die head is provided with external open teeth that engage with an open pawl in the diestock. These open teeth may gum-up or become damaged and cause slippage, which can result in accidents, especially when working on ladders. The better grade die heads are provided with driving lugs, which engage slots in the diestock. The diestock ratchet mechanism is fully enclosed in this type.

Adjustable die heads, Fig. 3, are also available for ratchet type stock. The change from standard to oversize or undersize threads is accomplished merely by rotating the index ring with the fingers. The ability to vary the depth of thread cutting is a very desirable feature, since it permits matching the pipe threads to those of the fittings used, thus insuring tight joints. The thread depths of pipe fittings vary considerably.

A variation of the non-adjustable type die head is shown in Fig. 4. This is called a 3-way threader. It is non-ratchet and employs a pair of removable pipe handles. It will thread 3 different sizes of pipe.

Adjustable dies, Fig. 5, are provided with leading threads in the tapered throat to pull the dies onto the pipe to start thread cutting. These dies are used in a non-ratchet type stock having die adjusting screws. This stock can be obtained with individual ring guides for each pipe size or with an adjustable guide that accommodates all pipe sizes within the capacity of the stock.

Fully adjustable dies, Fig. 6, are used in threading stocks equipped with adjusting cams. These permit the dies to be adjusted to the pipe size being threaded, a single set of dies being used for all pipe sizes employing the same number of threads; for example, ½ and ¾ in. (14 threads), and 1, 1¼, 1½ and 2 in. (11½ threads).



An automatic receding mechanism gradually moves the dies from full depth of thread cut at the beginning of the thread to off-the-pipe surface at the end of the thread, thus forming tapered threads. Since the dies do not contact the pipe after the thread is completed, the stock may then be slipped straight off the pipe. These stocks are available in ratchet and nonratchet types, and for threading conduit thread the dies are adjusted so as not to recede.

To permit larger pipe sizes to be threaded with minimum effort, reduction geared stocks are available in the fully adjustable types.

Pipe threading taps are made in both carbon steel and high speed steel types, and in taper or straight thread patterns. In the larger sizes they are available with inserted threading chasers, to reduce the cost of replacement.

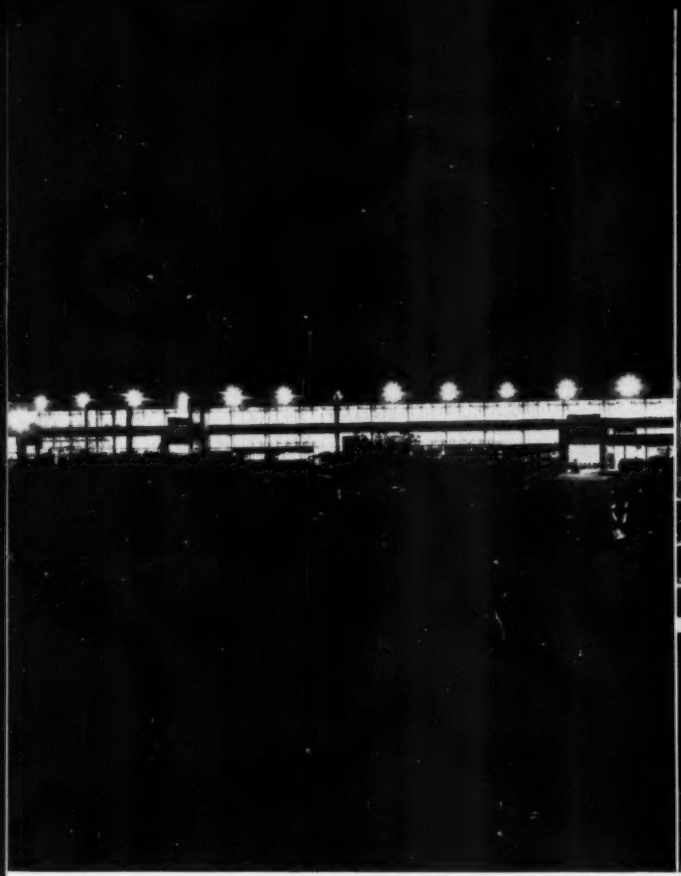
Taper pipe reamers are employed to ream holes to a taper before being threaded with a taper pipe tap. In the larger sizes they are available with inserted lands (cutting blades), to reduce replacement costs.

In selecting pipe threading stocks and dies, such factors as first cost, frequency of use, portability, maintenance, etc., should be considered. Where pipe threading is infrequent and wear consequently negligible, an inexpensive set of stock and dies will suffice, though the use of certain types may be dangerous, as previously mentioned. Weight, too, may not be important under such circumstances.

But where considerable pipe threading is handled, it is important that only high grade stocks and dies be chosen, because their cost per thread will be less. Such tools will produce more accurate threads, can be readily resharpened, and will have a longer useful life. In addition to possessing additional operating features, they require less set-up time, can be more quickly adjusted to cut the desired depth of thread, and will cut uniform thread length regardless of thread depth. Also, see that plenty of space is provided for chip clearance and die lubrication and that the weight is not excessive.

Before starting to thread a pipe, see that the end is square and be sure to ream out any burrs produced

(Continued on page 158)



BEFORE manufacturer extended work day to two-shift operation this large outdoor area was used for storage only. But . . .

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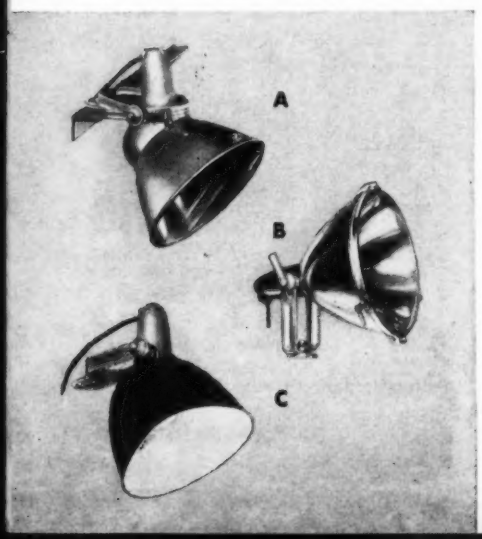


AND EUCLID ROAD MACHINERY CO. DOUBLED USE OF STORAGE AREA

To complete their new plant-wide, two-shift operation, the Euclid Road Machinery Co., large manufacturer of equipment for moving rock, ore, and earth, installed G-E floodlighting in its outdoor storage area. Now, their assembly lines are fed an uninterrupted supply of materials quickly and efficiently, at night as well as during the day.

MORE SAFETY, MORE PROFIT. "Workers appreciate the extra safety and more pleasant working conditions afforded by G-E floodlighting. It enables them to handle materials with minimum damage and confusion, bringing maximum speed and profit to our operation," says D. L. Lawrence, Plant Engineer.

LOW COST. An investment in outdoor lighting is insignificant compared to either your present investment in outdoor work areas or the increased productivity which G-E outdoor lighting achieves for you.

FOR INFORMATION on how you can make storage areas usable at night, speed the flow of materials along plant roadways, or facilitate work at loading docks and platforms with G-E outdoor lighting, write for bulletin GEA-3640, to Section 451-175, General Electric Company, Schenectady 5, N. Y.

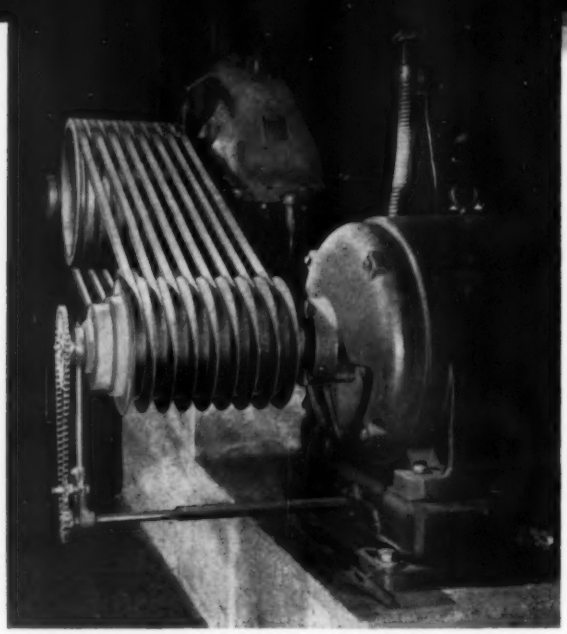
OUTDOOR INDUSTRIAL LIGHTING

GENERAL ELECTRIC

Variable Speed? Find the Range, Figure the Drive

At first look, figuring a variable speed drive is confusing . . . Key to the problem is the range . . . Analyze and simplify the problem to solve range relationships . . . Solution of sheave sizes follows easily

By F. J. DONAHUE, Application Engineer
Allis-Chalmers Manufacturing Co.



Typical eight-groove variable speed drive operates between a 50 HP motor and reducer, at speeds from 585 to 738 rpm

MANY ENGINEERS, including some V-belt drive men, shy away from calculating variable speed V-belt drives, considering it difficult and confusing. Actually such drives are not hard to figure and confusion is only the result of not using a simple logical approach.

The key to variable speed V-belt drive problems is expressed in the one word—range. Range may be defined as the relation between the minimum and maximum desired speeds. It may be equally well defined as the relation between the minimum and maximum pitch diameters of the adjustable pitch sheave used to produce those desired variable speeds.

To illustrate, consider in simple figures the significance of range in terms of desired driven speeds and in terms of variable pitch sheave diameters.

If, for example, it is desired to impose speeds of from 1200 to 1440 rpm on a centrifugal pump, the essence of the problem is the production of the pump speed range indicated. The relation of minimum and maximum speeds on the pump may be expressed in either of two ways: Maximum desired speed divided by minimum desired speed, 1440÷1200 equals 1.20; a second way, maximum speed minus minimum speed divided by the minimum speed, (1440-1200)÷1200 equals 0.20. Thus the range of speeds may be expressed as 1.20 or as 20%. In the first case, 1.20 is range expressed as the ratio of maximum to minimum speed. In the second case, range is expressed as the percentage increase from minimum to maximum. The first, being simpler, is considered preferable for general use.

Similarly, if we consider a B-groove, variable pitch sheave of 7.0 in. to 8.4 in. pitch diameter, the relation of minimum and maximum pitch diameters may be expressed in either of two ways: Maximum P.D. divided by minimum P.D., 8.4÷7.0 equals 1.20; a second way, maximum P.D. minus minimum P.D. divided by minimum P.D., (8.4-7.0)÷7.0 equals 0.20. Thus the range of diameters may be expressed as 1.20 or as 20%. That is, range is expressed as the ratio of maximum P.D. to minimum P.D. or as the percentage increase of P.D. from minimum to maximum.

Setting up a simple variable speed drive example, note the relation of speeds and pitch diameters. ⟶

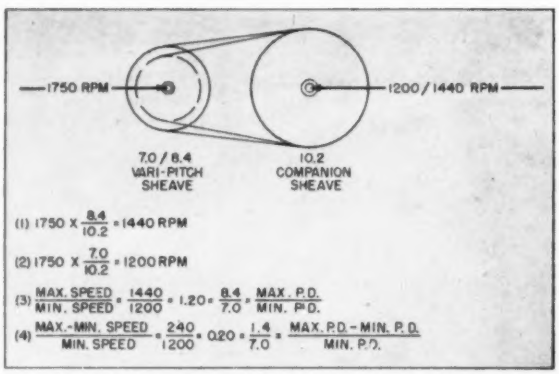
In the example, the relationships of driven speeds (range) expressed either as ratio of maximum to minimum or as the percentage increase from minimum to maximum are exactly the same as the like relationships of the P.D.'s of the variable pitch sheave (range) expressed either as ratio of maximum P.D. to minimum P.D. or as the percentage increase from minimum to maximum P.D.

At this point, the question arises: "What about the fixed diameter driven sheave (companion sheave)?" Actually, this fixed diameter or companion sheave merely produces rpm, and does not produce or influence the range. Range is produced by the variable pitch sheave only.

To illustrate this point, consider the result if instead of a 10.2 in. P.D. companion sheave a 20.4 in. P.D. companion sheave were used. Then in the example, the figures in (1) and (2) would become:

(1) 1750 × (8.4÷20.4) equals 720 rpm and (2) 1750 × (7.0÷20.4) equals 600 rpm. Thus the minimum and maximum speeds would become one half their former values but their relationship to one another would remain quite unchanged: 720÷600 equals 1.20; 120÷600 equals 0.20.

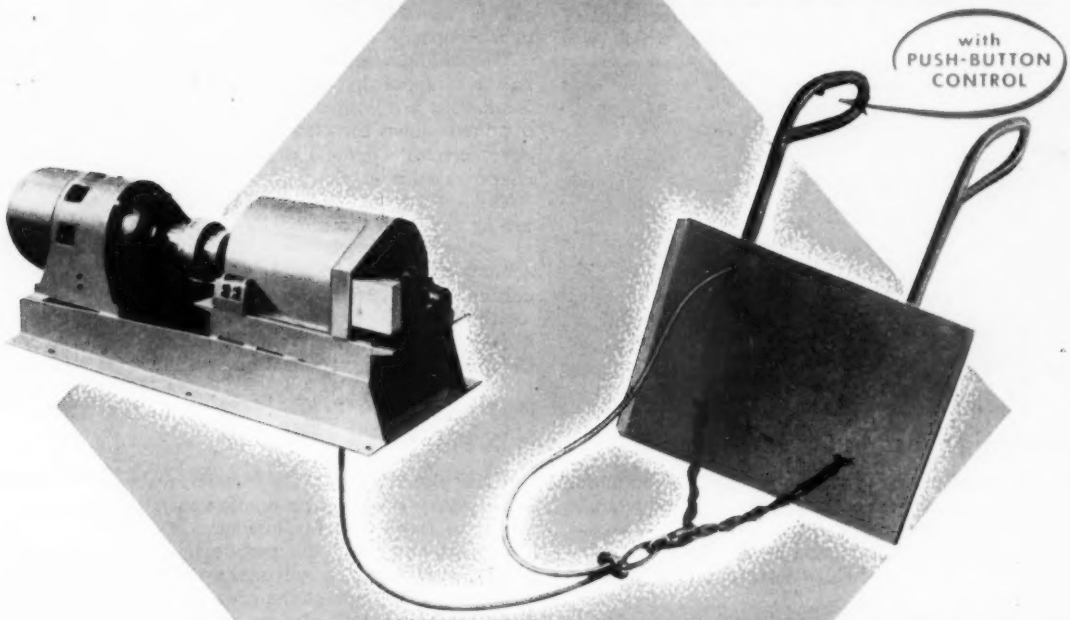
When a problem is encountered involving a variable speed V-belt drive, first convert it to its essence, range, in terms of the desired minimum and maximum speeds and then pick the variable pitch sheave which has the same or greater range in terms of minimum and maximum pitch diameters.

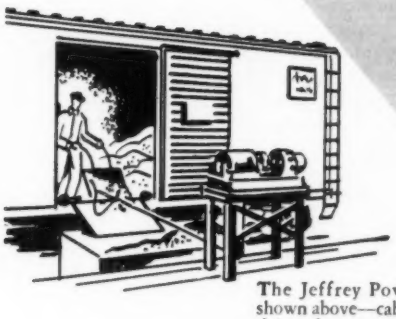

1750 RPM
1200/1440 RPM
7.0/8.4 VARI-PITCH SHEAVE
10.2 COMPANION SHEAVE
(1) 1750 X 8.4/10.2 = 1440 RPM
(2) 1750 X 7.0/10.2 = 1200 RPM
(3) MAX. SPEED / MIN. SPEED = 1440/1200 = 1.20 = 8.4/7.0 = MAX. P.D. / MIN. P.D.
(4) MAX.-MIN. SPEED / MIN. SPEED = 240/1200 = 0.20 = 1.4/7.0 = MAX. P.D. - MIN. P.D. / MIN. P.D.

Drawing and figures in V-belt sheave selection show relation between speeds and pitch diameters in determining range

FLASH! ..Here's a SCOOP

AND IT'S FULLY AUTOMATIC





The Jeffrey Power Scoop is shown above—cable reel direct-driven from motor and reducer, all mounted on substantial base. Drawing shows material being moved to the car door for discharging into hopper—or chutes, elevators or conveyors.

Positive control and safe operation are features of this NEW Jeffrey Automatic Power Scoop. Used for unloading bulk material from box cars, this SCOOP is fully automatic, light in weight, and can be moved backward and forward at will before moving the material to the door for discharging. *An electric push button in the handle* makes operation easy. When pulling Scoop back, cable is unreeled only to required length—no slack to interfere. One man can do the work. Write for additional information.

THE JEFFREY MANUFACTURING COMPANY
905 North Fourth St., Columbus 16, Ohio

Material Handling, Processing and Mining Equipment

For more facts circle 560 on Reply Card

Modernized Plant Office Features Unusual Ceiling Treatment

Recent modernization of the plant offices of the Thew Shovel Co., Lorain, Ohio, featured a new treatment of the totally-luminous ceiling. This ceiling, which was used in the reception room and adjoining executive offices, combines illumination and acoustical baffling in a composite unit.

The ceiling areas were covered by 4 ft square luminaires, framed in acoustical baffles. The individual luminaires are hinged just off center, to permit swinging them down for cleaning. The luminaires are concave, forming a dome-like section, to offset the cold-flow characteristics of the plastic.

The acoustical baffles, consisting of U-shaped channels, are drilled with thousands of holes. These allow sound to enter the baffle, which contains wedge-shaped acoustical material. The 4-way joining section at each corner of the luminaires can be used for sprinkler or ventilation outlets. The ceiling was designed and furnished by the F. W. Wakefield Brass Co., Vermilion, Ohio, as a lighting innovation in industry.

Trailer Brings Testing Equipment to the Gages in Plants

The first mobile gage testing laboratory in the nation has been put into operation at the Evans Products Co., Plymouth, Mich.

The new laboratory, designed and built for the Detroit Ordnance District, brings testing facilities to industrial plants serving the District, rather than making it necessary for plant production men to take gages to a central laboratory for testing.

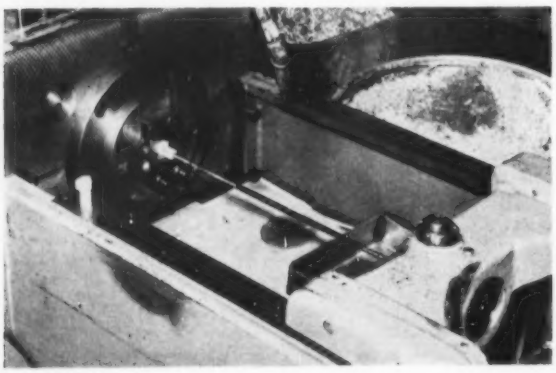
It is planned that the mobile laboratory, housed in a 28-ft trailer, which will make periodic visits to supplier plants throughout the area served by the District, and its facilities will also be made available to smaller defense plants in the area.

Weighing slightly under 5 tons, the trailer carries a 3-man crew of technicians. It is heavily insulated, and is equipped with its own heating and air conditioning system to maintain standard gage testing temperature of 68 degrees. It can be operated on electrical power from any plant it visits.

Along with more than 80 small tools used in checking gages, larger pieces of equipment—including an Eastman contour projector, a Pratt & Whitney Universal Measuring machine, three granite surface plates, super micrometer and internal measuring machine—are provided fixed counter space.

Broaching Operation Sizes Cams Made of Solid Nylon

Solid Nylon, used in cams and non-continuous bearings for light machinery, is quite difficult to machine. The material is flexible, easily distorted in clamping, abrasive, (creating a tool wear problem) and its low melting point requires care to prevent overheating during cutting.



Machining operations are being carried out successfully on several Nylon parts used in sewing machines produced by the New Process Gear Co., Syracuse, N. Y. One of these, an eccentric cam, is plastic molded, but for precision is subsequently machined.

A progressive broach, designed by Colonial Broach Co., Detroit, is used with a broach follower to guide the broach and avoid drift. The first 11 teeth on the broach rough the hole, while the next 18 teeth rough the keyway. The last few teeth finish the keyway and size the hole. Step per broach ranges from .001 to .003 in. Only about .010 in. of stock is removed per side.

Broaching speed is 18 ft per minute (3.6 in. per second). Soapy water is used effectively as a coolant. Life of broaches per grind is from 2,000 to 2,500 pieces, and the output average 14 pieces per hour.

Concrete Block Testing Requires Close Humidity Control

A modern research and development laboratory in Skokie, Ill., is the largest and most completely equipped in the world, devoted exclusively to research on cement and concrete.

Observations of concrete in the field are a function of the Portland Cement Association. To supplement and expand actual field studies, the Association uses their lab to simulate the same field conditions, by controlling temperature and humidity in their testing rooms.

A 2500 cfm air capacity Kathabar humidity conditioner, built by Surface Combustion Corp., Toledo, Ohio, creates laboratory room atmospheres of 25-45 per cent relative humidity for as long a period of time as required.

The curing of concrete blocks is the subject of many tests. Four different types of specimens, 3 lightweight aggregates and one heavyweight, are observed over a period of time. They are tested for expansion and contraction due to moisture changes, and for weight changes resulting from the moisture changes.

Dipping and Drying Units Prepare Pipe for Enamel Coating

To complete the sequence of operations for the successful application of porcelain enamel coatings to black steel pipe, the Barrows Porcelain Enamel Co., Cincinnati, has two unusual pieces of equipment—a dipping machine and a drying unit—now in operation.

In the application of ceramic coatings to pipe, the first operation is a thorough sandblasting inside and out. Next the "slip," or wet enamel, must be applied to the metal base. This slip is a water vehicle solution and can be either dipped or sprayed. For uniform application and close control of thickness, Barrows applies the slip in a dipping operation.

The dipping unit consists of two long troughs to hold enamel slips. One contains ground coat material and the other cover coat material. Between the two troughs is a third shallow trough with fittings at each end to hold any length of pipe up to 21 feet.

The second piece of equipment dries the pipe. Formerly, air passing through the inside of the pipe would become quickly saturated, and condense the moisture out in the form of water. This water washed the unfired coating off the inside of the pipe.

The drying apparatus, consisting of a series of 15 chambers mounted in rotary fashion, prevents the condensation. Each chamber will hold one length of pipe. Steam-heated air is introduced to the chamber to flow around the inside of the pipe, drying the slip. The drier will handle more than 4,500 ft of pipe per shift.

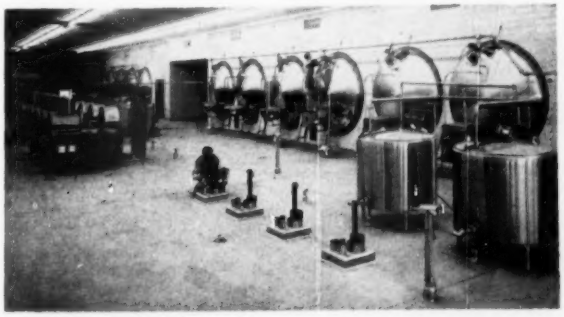
Triple-Threat Washing Stations Promote Cleanliness in Plant

The new ice cream plant built by the Rieck-McJunkin Dairy Co., in Pittsburgh, Pa., embodies the latest improvements in the art of ice cream making, using the principles of straight line production.

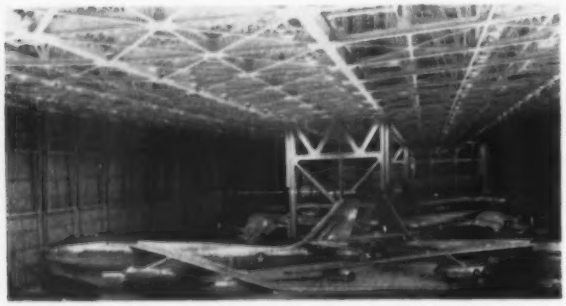
Each of the 3 kinds of materials brought into the plant—dairy products, flavoring ingredients and packing materials—has its own delivery platform and storage facilities in the plant.

The actual ice cream processing takes place in one large room with a total area of 10,000 sq ft. Projecting through the title wall on one side of the room are the polished heads of 13 stainless steel storage tanks, and provisions have been made to line 13 freezers down the center of the room.

An unusual feature is the use of pedestal wash-up stations, which are installed throughout the plant. Each pedestal head has 3 faucets. These faucets provide hot water, cold water, and a pre-mixed detergent cleaning solution, readily available for washing down equipment and floors.



Cantilever Construction "Opens Up" Hangar Walls for Big Planes



As part of the current expansion program at Boeing Airplane Co.'s Wichita Division, a new flight hangar has been constructed.

The cantilever-type hanger is one of the largest of its kind ever built. With all the support for the structure at the center, supports around the edges are not needed. As a result, when the hangar doors are open, unobstructed movement through the hangar is facilitated. The hangar, to be used in inspection and testing operations, can accommodate 12 B-47 jet bombers.

In the hangar framework, 10½ million lb of structural steel are held together by approximately 220,000 rivets of all sizes.

Heavy-Duty Heating System Keeps Plant Driveway Free of Snow

To assure easy winter-time exit for trucks leaving an interior loading area, Sprout-Waldron & Co., Inc., of Muncy, Pa., builders of machinery for the flour, feed and general processing industries, installed a snow melting system to serve the 50 ft by 24 ft driveway of a new plant addition.

To achieve a system able to stand up under loads of heavy machinery carried by trucks using the drive, it was decided to embed wrought iron pipe grids in the concrete paving of the drive, for circulation of heating liquid. The system has proved completely satisfactory under winter conditions. The wrought iron pipe is manufactured by the A. M. Byers Co., Pittsburgh.

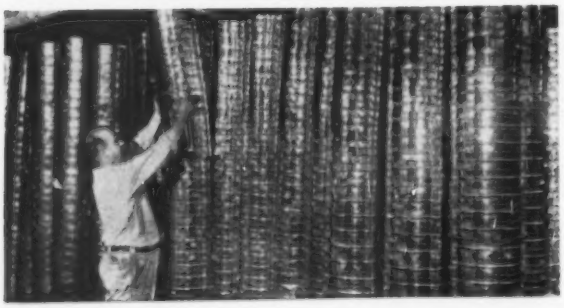
Hand and Power Trucks Team Up for Economical Materials Handling

Cost-saving possibilities are being recognized in the use of hand trucks to supplement and augment power truck handling equipment. Experience has brought out the practicability of using less expensive hand trucks for short hauls, releasing the power trucks for longer transporting jobs and for their specialty, stacking.

With the team arrangement, hand trucks are used for order picking and for assembly of loads in a central spot for power equipment to take over for longer hauls.

A paint manufacturer uses a hydraulic pallet truck and an electric fork truck together. The pallet truck brings the load to the warehouse area where it is to be stored, and the lift truck picks it up for stacking. Both trucks were manufactured by Lewis-Shepard Products, Inc., Watertown, Mass.

"Fussy" Rubber Cement Requires Oversize Inventory of Buckets



The purchasing department of the B. F. Goodrich Co., Akron, Ohio, is a factor to be considered in the bucket market. Their receiving department handles 3 types of buckets, purchased for use in the Goodrich plants. The Akron plant alone uses 1600 pails, in which they put rubber cement used in plant operations, each month.

Chemical properties of the rubber cement make it necessary that the pails be completely clean after each usage, or the next batch of cement put into them will not have the proper adhesion qualities.

Balancing the cost of new pails against the cleaning costs, the economical advantage lay with the purchase of new pails, so the pails are scrapped after each use.

Powell Engineers always look to the future!

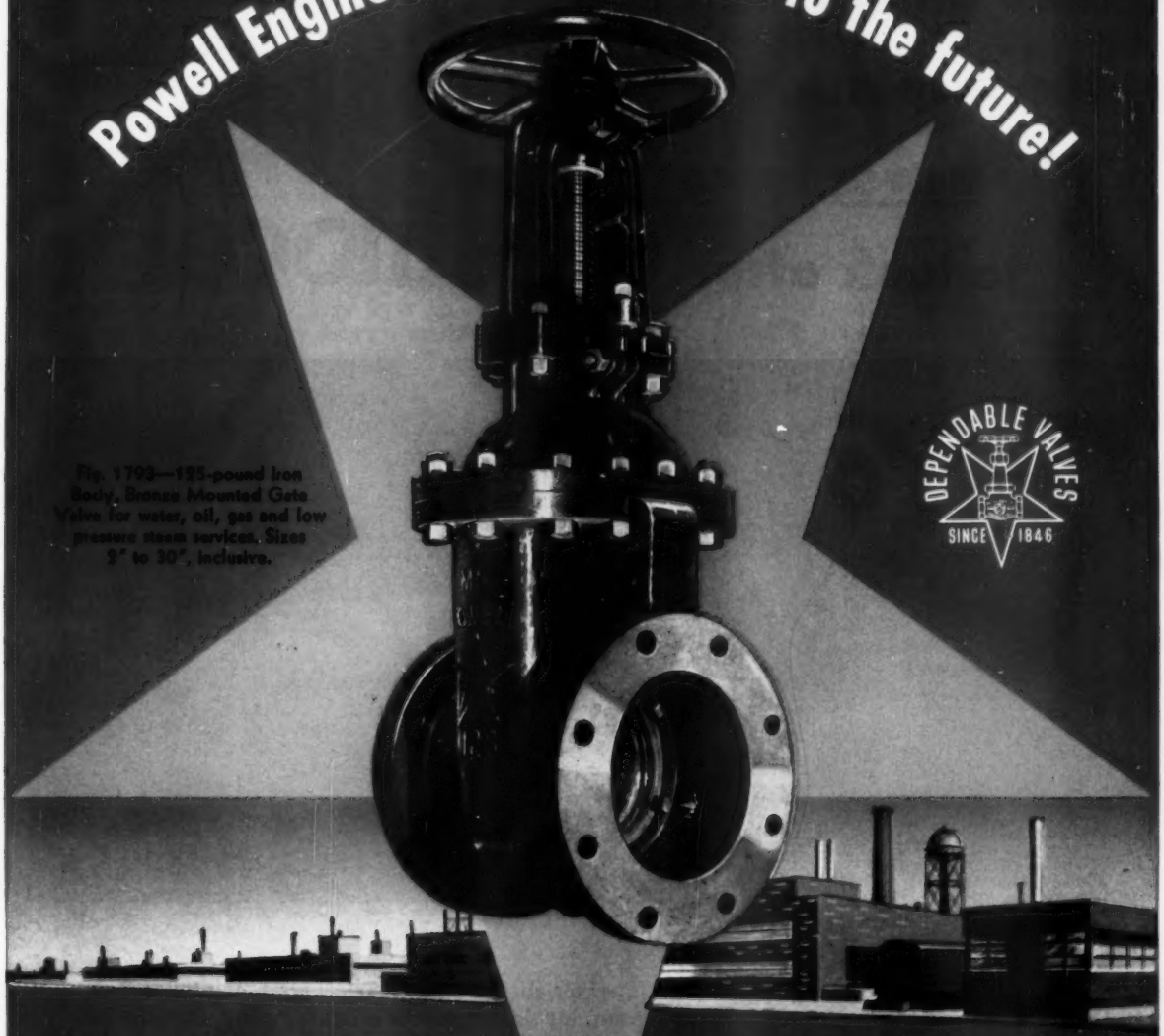


Fig. 1793—125-pound Iron Body, Bronze Mounted Gate Valve for water, oil, gas and low pressure steam services. Sizes 2" to 30", inclusive.

DEPENDABLE VALVES SINCE 1846

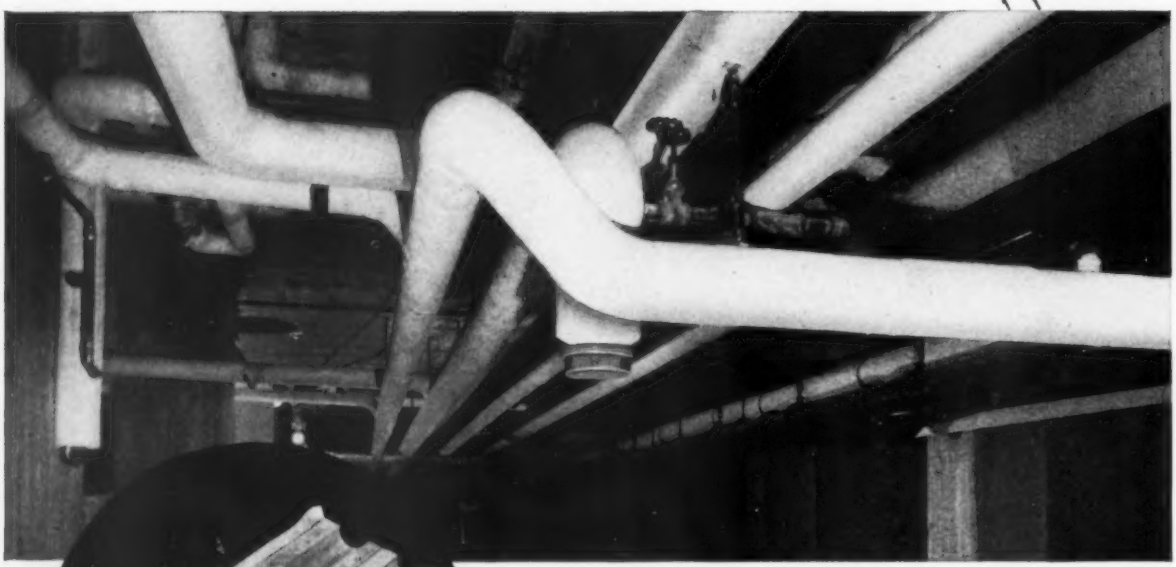
Powell Valves are not only made in every type, size and material needed to meet all your flow control requirements but, because Powell Engineers always look to the future, they give special attention to those important details in design that make all Powell Valves give such long, dependable service and require so little maintenance.

The Wm. Powell Company
Cincinnati 22, Ohio

POWELL

BRONZE, IRON, STEEL AND CORROSION-RESISTING VALVES

take a long look at the insulation you never have to look after.... Amocel



That's right! Unarco Amocel is as maintenance-free as an insulation can be—light, strong, durable ,efficient. It's unharmed by moisture, steam, fumes; withstands impact and vibration; may be removed and reused repeatedly without damage or efficiency-loss.

Amocel, a Unarco exclusive, brings to commercial insulation applications many of the excellent features already made famous by Unarco Unibestos—the higher-temperature stand-out. You'll like its easy installation, its clean appearance, its year-after-year effectiveness.

UNARCO

your Unarco Distributor has Amocel

Call him, or write for literature

UNION ASBESTOS & RUBBER COMPANY

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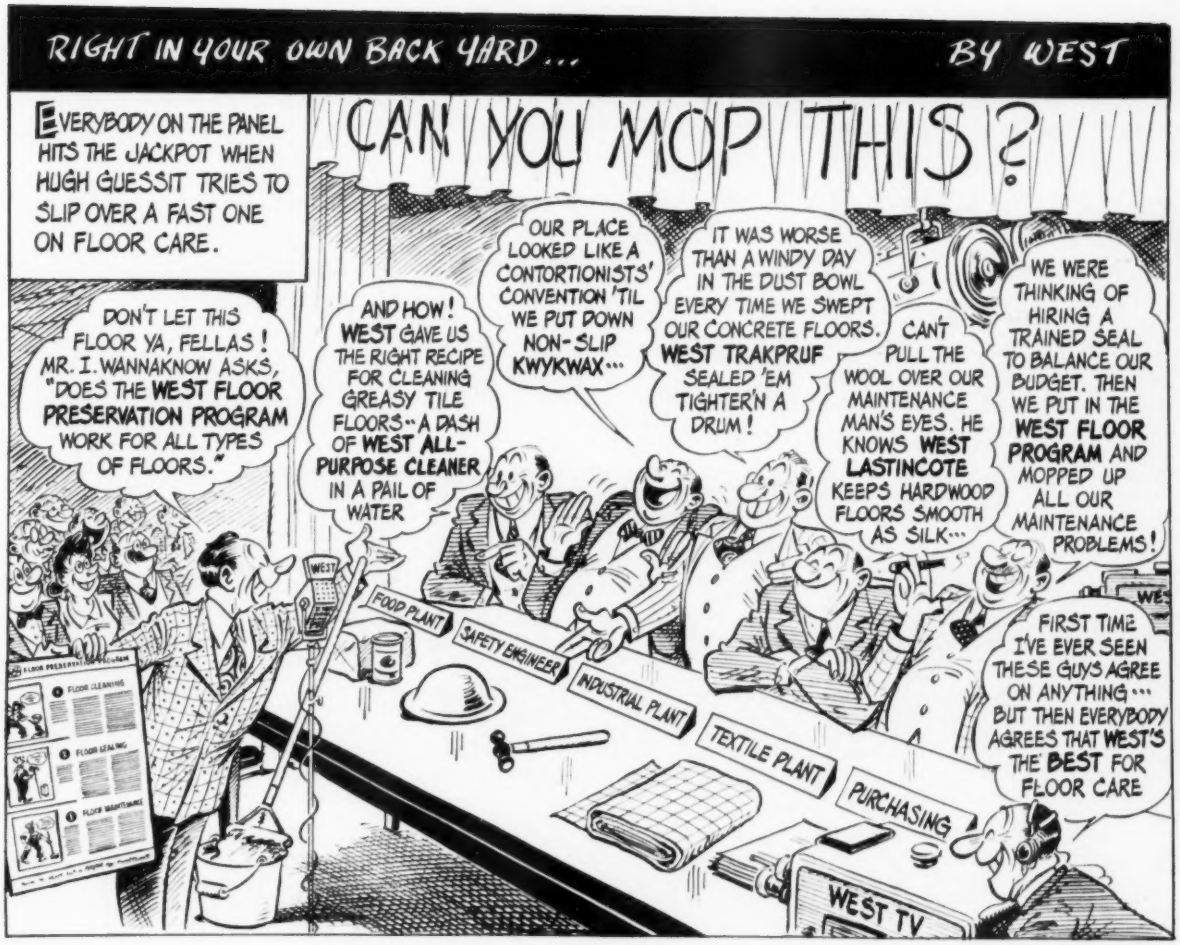
For more facts circle 562 on Reply Card


RIGHT IN YOUR OWN BACK YARD...
BY WEST
EVERYBODY ON THE PANEL HITS THE JACKPOT WHEN HUGH GUESSIT TRIES TO SLIP OVER A FAST ONE ON FLOOR CARE.
CAN YOU MOP THIS?
DON'T LET THIS FLOOR YA, FELLAS! MR. I. WANNAKNOW ASKS, "DOES THE WEST FLOOR PRESERVATION PROGRAM WORK FOR ALL TYPES OF FLOORS."
AND HOW! WEST GAVE US THE RIGHT RECIPE FOR CLEANING GREASY TILE FLOORS--A DASH OF WEST ALL-PURPOSE CLEANER IN A PAIL OF WATER
OUR PLACE LOOKED LIKE A CONTORTIONISTS' CONVENTION 'TIL WE PUT DOWN NON-SLIP KWYKWAX...
IT WAS WORSE THAN A WINDY DAY IN THE DUST BOWL EVERY TIME WE SWEPT OUR CONCRETE FLOORS. WEST TRAKPRUF SEALED 'EM TIGHTER'N A DRUM!
CAN'T PULL THE WOOL OVER OUR MAINTENANCE MAN'S EYES. HE KNOWS WEST LASTINCOTE KEEPS HARDWOOD FLOORS SMOOTH AS SILK...
WE WERE THINKING OF HIRING A TRAINED SEAL TO BALANCE OUR BUDGET. THEN WE PUT IN THE WEST FLOOR PROGRAM AND MOPPED UP ALL OUR MAINTENANCE PROBLEMS!
FIRST TIME I'VE EVER SEEN THESE GUYS AGREE ON ANYTHING... BUT THEN EVERYBODY AGREES THAT WEST'S THE BEST FOR FLOOR CARE
FOOD PLANT
SAFETY ENGINEER
INDUSTRIAL PLANT
TEXTILE PLANT
PURCHASING
WEST TV

New floors cost $300,000,000 *a year!*

TYPE OF FLOOR	INSTALLED COST* OF 50,000 SQ. FT.
Asphalt Tile	$15,000
Concrete	18,000
Linoleum	21,000
Hardwood	27,500
Cork	39,000
Rubber Tile	44,000
Vinyl Tile	44,000
Ceramic Tile	65,000
Terrazzo & Mosaic	87,500
Marble	300,000

*Based on reports of reliable flooring contractors in urban areas.

How much will it cost you to replace worn-out floors today? The chart gives you some idea.

But, your floors *don't have* to wear out. They can be protected almost indefinitely.

How? With West's simple, proven FLOOR PRESERVATION PLAN. (1) *Cleaning* — remove all dirt without harming floors (2) *Sealing* — fill the pores. Provide a protective coating (3) *Maintaining* — put on a tough, anti-slip floor wax.

The West Plan offers you more than 20 proven products. A West Floor Specialist will be glad to help you select the program or product you need.

WEST DISINFECTING Company

42-16 West Street, Long Island City 1, N. Y.

Please send FREE booklet "Proper Care of Floors"

DEPT. 52

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

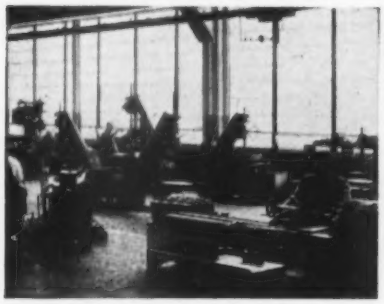
For more facts circle 563 on Reply Card

Is your heating problem here?

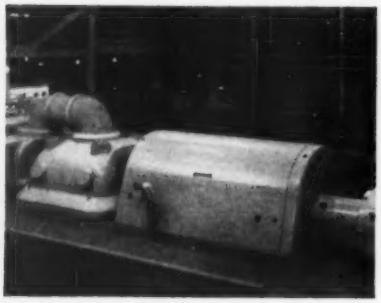
Negative pressure resulting from exhaust fans, sucks in cold air.

Drafty doorways that let in big blasts of cold air.

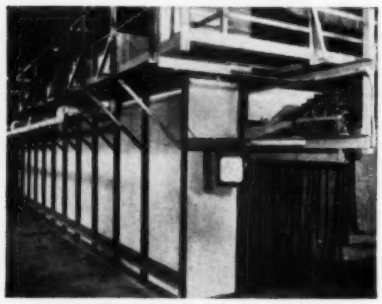
High ceilings that waste large volumes of rising heat.



Cold windows that pour chilling drafts down on the floor.



Large areas that consume excessive amounts of heat.



Processing needs that require high temperatures.

There's a Trane unit heater here to solve it!

Ventilating Heater

Roof hood, with heating section optional, provides make-up air; solves negative pressure problems.

Model H Unit Heater

. . . with exclusive *louver fin* diffuser, puts heat *where* it's needed, *whenever* it's needed.

Force-Flo Heater

. . gives you a large volume of heated air from a handsome compact unit.

Torrider

. . . blower-type, delivers large volumes of heated air long distances, with or without ducts.

Projection Heater

. . . with exclusive *louver cone* diffuser, projects ceiling heat to floor accurately, powerfully.

Gas-Fired Unit Heater

. . . rugged, built like a boiler. Brings you new efficiency and economy in gas-fired heating.

To get the right kind of heat—choose from the line that's most complete

You'll find that these six TRANE Unit Heaters, together with the two exclusive diffusers, give you the *one right* combination for *any* unit heater application.

And that's the secret of efficient, economical heat—getting the *right* heater for the job.

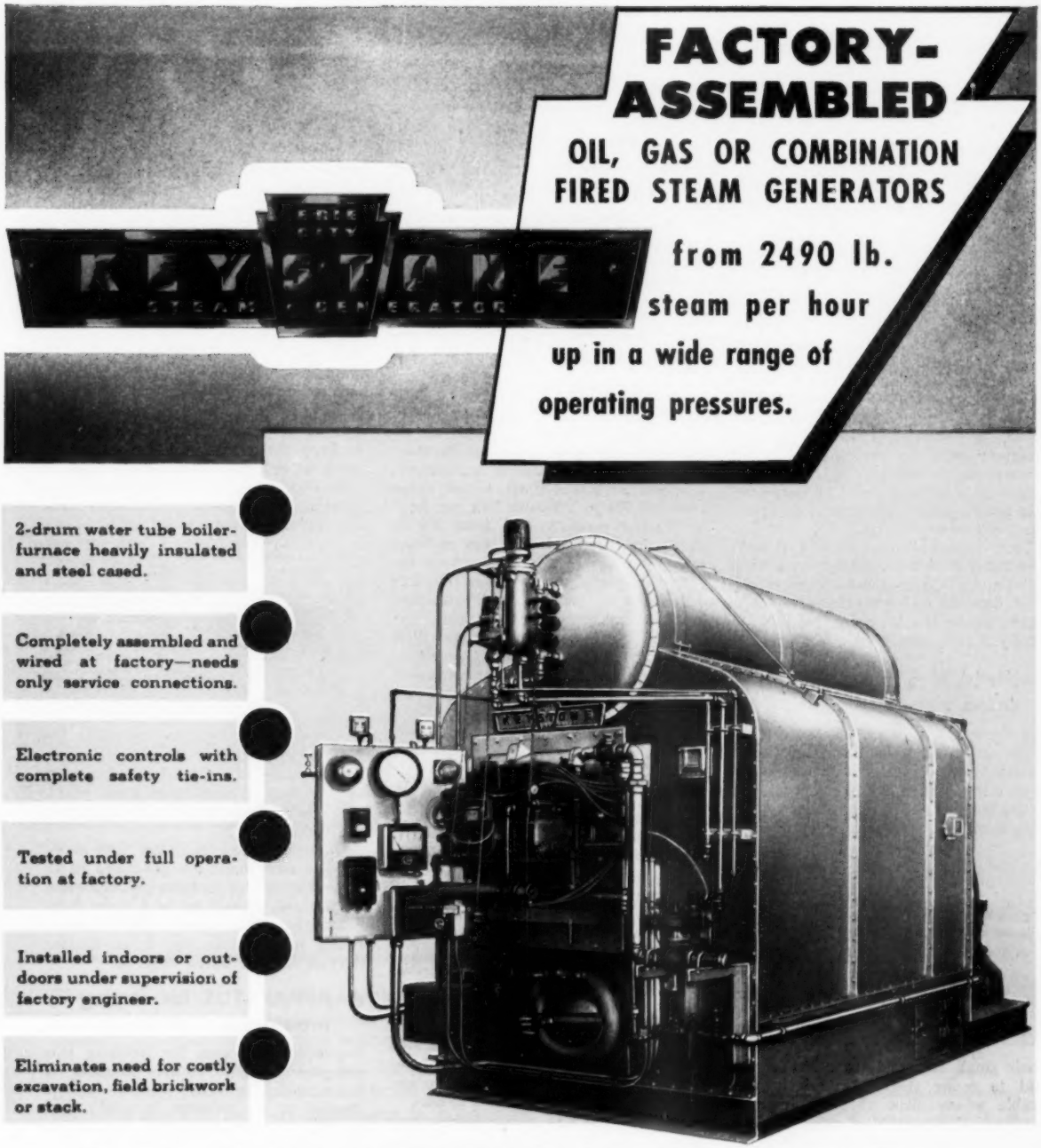
See your nearest TRANE sales engineer, or write TRANE, La Crosse, Wis.

TRANE unit heaters

The Trane Company, La Crosse, Wis. • Eastern Manufacturing Division, Scranton, Pennsylvania
Trane Company of Canada, Limited, Toronto, Ontario • 80 United States and 14 Canadian Offices

MANUFACTURING ENGINEERS OF AIR CONDITIONING, HEATING AND VENTILATING EQUIPMENT

For more facts circle 564 on Reply Card



FACTORY-ASSEMBLED

OIL, GAS OR COMBINATION FIRED STEAM GENERATORS

from 2490 lb. steam per hour up in a wide range of operating pressures.

- 2-drum water tube boiler-furnace heavily insulated and steel cased.
- Completely assembled and wired at factory—needs only service connections.
- Electronic controls with complete safety tie-ins.
- Tested under full operation at factory.
- Installed indoors or outdoors under supervision of factory engineer.
- Eliminates need for costly excavation, field brickwork or stack.

Locate A KEYSTONE *Where You Need Steam*

Keystone is big water tube boiler performance in a compact unit—permits you to make high pressure steam at or near the point of use. Keystones are automatic and require only part time supervision. Keystones give you flexibility for quick steam application to meet emergencies. They are efficient, dry steamers, complete with all necessary instruments and safety controls—even the panels are wired at the factory and you can be on the line within hours of the arrival of your Keystone. Investigate the installation and operational economies of the Erie City Keystone Steam Generator.

For complete data ask for Bulletin SB-38

You can depend on Erie City for sound engineering

ERIE CITY 112 Years in Steam Generation

ERIE CITY IRON WORKS • *Erie, Pa.*

STEAM GENERATORS • SUPERHEATERS • ECONOMIZERS • AIR PREHEATERS

UNDERFEED AND SPREADER STOKERS • PULVERIZERS

For more facts circle 565 on Reply Card

NEW PRODUCTS summarized for your convenience

Edited by M. E. Heniken

Use the Reader Service Cards on pages 37-38 and 167-168 to ask for more information on these products. Circle item numbers of products in which you are interested.

1—PALLET TRUCKS come in rider or walker types

First 1953 models in this company's Powrworker line of lift trucks are electric battery-powered with a capacity rating up to 6000 lb. The can be supplied with pallet forks to handle any size pallet, either single or double faced. Of two models available, a rider type has a tread plate where the operator can stand; it takes power from a single-tray battery arrangement. The conventional walker model has a double-tray battery layout. Company says the Powrworker is the shortest truck capable of carrying a double-tray battery, and this combination assures great utility in close operating quarters.

These pallet trucks feature double hoisting cylinders for lifting the loaded pallet and a 5 hp motor-in-wheel drive. (For detailed information on these trucks circle No. 1 on Reader Service Card.) Clark Equipment Co.

2—IMPULSE STEAM TRAP of small size, high capacity

The Series 50 Yarway Impulse Steam Traps are offered for use where condensate must be handled in unusually large quantities. An important feature of the traps is ability to maintain high, even temperature in process equipment.

Their small size and light weight are said to make them particularly desirable where close quarter piping is involved. Constructed of stainless steel, they are designed to withstand difficult operating conditions, such as encountered in refineries and chemical plants, and are reported especially successful for condensate drainage on heat exchangers and stage heaters, reboilers, stills, evaporators.

Basic operating principle is the same as that employed in company's Series 60 and 120 types. The traps have a hinged lever and two valves mounted on a valve seat plate, and the control flow which governs opening and closing action of the valves is obtained by allowing a small clearance between inlet and outlet valves and their seats when the lever is at rest. (For Bulletin T-1745 on these impulse steam traps and their uses circle No. 2 on Reader Service Card.) Yarnall-Waring Co.

3—INDUSTRIAL HEATERS for large area heating jobs

An improved line of heaters which deliver large volumes of heated air for areas which cannot be heated by more conventional methods is announced. The self-contained units, which range from 100,000 to 2,500,000 Btu per hour in heating capacity and from 200 to 25,000 cfm in air velocity, may be floor, ceiling or wall (either upright or inverted position) mounted. The new line includes a heavy duty model designed for steel, rubber and paper mills.

Available accessories include filter boxes for built-in mechanical air cleaning and air mixing boxes for controlled mixing of fresh and recirculated air. (For further information circle No. 3 on Reader Service Card.) Sturtevant Div., Westinghouse Electric Corp.

4—FLOOR DUCT, synthetic rubber, covers inside wiring

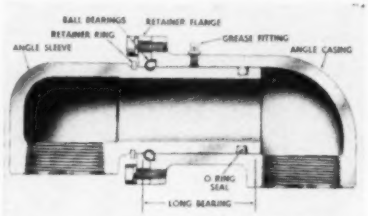
Many over-the-floor wiring problems can be solved with Flexiduct and a tube of special cement. Although developed for telephone wiring applications, the duct is also suggested for such electrical wiring as extension cords for fans, office equipment, lamps. Flexiduct is made of synthetic rubber and described as moisture proof and long wearing. It is 2¾ in. wide at base and rises from a feather edge to an apex of 7/16 in. Manufacturer says it can be cemented down, in any length desired, to all types of floor surfaces—yet be pulled up and removed by prying one end loose.

The standard size accommodates two to eight conductors of inside wires; by removing the bottom web of the standard size it will cover four pairs of plastic covered wires. A special larger size carries inside wire cable as well as switchboard cable up to a maximum of 25 pairs. Riser fittings, "T" and "L" angle fittings are available. (For details circle No. 4 on Reader Service Card.) Goodyear Tire and Rubber Co.

5—STEEL SWING JOINTS incorporate ball bearings

An extensive new line of ball bearing equipped swing joints for use on loading and unloading joints handling oil, gasoline, chemicals and other liquids is announced. Their design is distinguished by a long lubricated bearing to provide support for piping, and a method of positioning the ball bearings to keep them from falling out when the joint is taken apart.

Sealing is by an "O" ring confined in a recess in the sleeve of the point. Special "O" rings are provided for handling



liquids without softening, swelling or deterioration at temperatures from -30 to 250 F, it is noted, and these joints are also suitable for pressures to 1500 psi hydraulic.

Offered in steel for heavy duty service, the new joints are produced in 11 styles, including counter balance and double swing, and in four sizes from 2 to 4 in. (For Catalog 400 on these swing joints circle No. 5 on Reader Service Card.) Barco Mfg. Co.

6—APPARATUS for drying or moistening atmospheric air

Improved apparatus for utilizing this company's "liquid contact method" is announced. In this method air is treated to fix relative humidity and temperature independently, as separate functions, to obtain closer control of results. Filtered fresh air enters a new type of spray chamber providing intimate contact between air and the spray liquid. The spray either adds moisture or removes it by absorption or by condensation. Condition of the spray liquid (temperature or absorbent concentration) determines the moisture content of the air leaving the chamber. Final temperature is fixed as a separate function, either within the apparatus or external to it, to give control of room conditions by thermostats.

The spray liquid used may be either refrigerated water or company's Hygrol. Applications for the apparatus include establishment of dry atmospheres for protection, processing or drying, as well as for comfort air con-

It's not what you pay - it's what it costs

There probably isn't a thing you buy that you couldn't buy cheaper. Provided, that is, you didn't figure the real cost—provided you weren't concerned with getting your money's worth. Right?

But you are concerned. You buy for longer wear. You buy for freedom from trouble. You buy for fewer repairs . . . for more dependable service. You buy equipment to be worked—not to be laid up. You know that thrifty buying isn't merely price-tag buying.

And it's to you, the thrifty buyer, that we like to sell Crane piping equipment. Whether it's a high pressure, high alloy valve or a ½" malleable pipe fitting, every unit in the Crane line is built to last longer with fewer repairs and lower servicing costs. That's why year in and year out thrifty buyers have put more Crane Valves in service than any other make.

Crane Co., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois. *Branches and Wholesalers Serving All Industrial Areas.*

CRANE

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

For more facts circle 566 on Reply Card

NEW PRODUCTS

(Begins on page 120)

ditioning. In the latter, this method is said to provide large amounts of fresh, dry air at low cost, permitting cooling or heating to be done economically with room conditioners of any type. (For details circle No. 6 on Reader Service Card.) Niagara Blower Co.

7—WIRE TERMINALS, silver coated, come in five sizes

Until recently produced only for use with manufacturer's own electrical distribution products, Wire Grips are being made available in five sizes covering all wire sizes from No. 14 wire to No. 1,000,000 C.M. cable. The company will continue to produce the silver-clad Wire Grips by the cold forging method to assure greater strength of the electrolytically pure copper from which they're formed, it is announced. This greater mechanical strength permits a smaller, more compact wire grip to do the job of bulkier devices. The two

larger sizes are equipped with "saddles" that fit the curvature of the cable so that good contact is made over the entire circumference of the conductor. (For details on Wire Grips circle No. 7 on Reader Service Card.) BullDog Electric Products Co.

8—FLOOR WAX is non slip, for long-lasting surfaces

Manufacturer of the new Triple Service Floor Wax says it is listed as highly anti-slip by Underwriters' Laboratories, is neither tacky nor gummy, and has unusual self-leveling qualities. It dries to a transparent shine in less than 20 min, withstands repeated damp-moppings and be spot-cleaned and spot-waxed. Company adds that it is easily removed, yet is water resistant within an hour after application. (For illustrated data sheet covering this new preparation circle No. 8 on Reader Service Card.) Industrial Div., R. M. Hollingshead Corp.

9—UNIT HEATERS with electric heating elements

This new line of heaters and heater sections is designed for use where steam, hot water or gas is not available or economical to use. The heaters come in sizes delivering from 13,600 to 204,000 Btu's per hour and the sections from 25,500 to 204,000 Btu's per hour. The smallest unit discharges at the rate of 235 cfm, the largest at 3600 cfm.

Types of unit heaters available include a ceiling-suspended, downward discharge type with revolving discharge outlets for work areas, a ceiling-suspended downward discharge heater with stationary discharge outlets primarily for storage areas, and a horizontal discharge heater with adjustable vanes for use at relay stations, pump houses and other locations where steam lines are not feasible. In summer, with the heating element turned off and the fan on, these electric heaters make good cooling systems.

The heater sections are designed to be applied to a run of duct, for process heating or replacing exhausted air with fresh tempered air. (For details circle No. 9 on Reader Service Card.) L. J. Wing Mfg. Co.

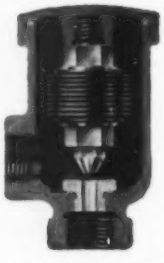
10—INSULATION has thermal, acoustical properties

Designed for use where an efficient thermal and acoustical insulation is needed and minimum weight is a consideration, Ultrafine is described as an exceptionally lightweight, fine glass fiber insulation that is fire resistant and won't rot, mold or decay. It is resilient and resists vibration, company points out, is odorless, not corrosive to metals and is resistant to attack of most acids and alkalis.

Ultrafine comes in rolls, plain or faced, with a choice of five vapor barrier facings—or it may be die-cut to any shape. It can be cut with knife or shears and applied to heated and cooled equipment within the temperature limits of the material (up to 450 F). Its flexibility and resilience permit application to irregular shaped objects without special fitting. Adhesives, wires, staples or jute twine are all that's needed to hold it in place. (For information circle No. 10 on Reader Service Card.) Gustin-Bacon Mfg. Co.

11—STEAM TRAP is small in size, capacity and price

The new Type D Thermostatic Bellows Steam Trap is offered for industrial applications requiring a smaller trap.



It embodies several improved design features, including generous sized hexagon shanks to accommodate standard wrenches, for installing or removing bellows or valve, to eliminate strain on the bellows element. It also has a rugged internal guide rod and tube for maintaining alignment of valve and seat, as well as removable hardened stainless steel valve and seat. The trap is made of bronze in four sizes from ¼ to ¾ in., angle type only, for pressures from vacuum to 200 lb. (For Bulletin 351 describing the Type D Steam Trap circle No. 11 on Reader Service Card.) W. H. Nicholson & Co.

12—DOUBLE-BRIDGE CRANE, long span, 10-ton capacity

This newly developed monorail type crane with 10-ton hoist carrier mounted between the two bridges offers considerable extra hook clearance for profitable use of storage area. Another advantage is its possible long-span application. The stiffening effect of the two special bridge beams, together with the diagonal bracing, is designed to permit cranes to be built for maximum coverage.

Special features include the use of self-aligning truck trolley. All movement is power operated including interlock for transfer of carrier on double spur tracks over recessed receiving dock. Control is centered in push-button station suspended from carrier. (For more information circle No. 12 on Reader Service Card.) American MonoRail Co.

13—ALUMINUM LADDER has full width flat step

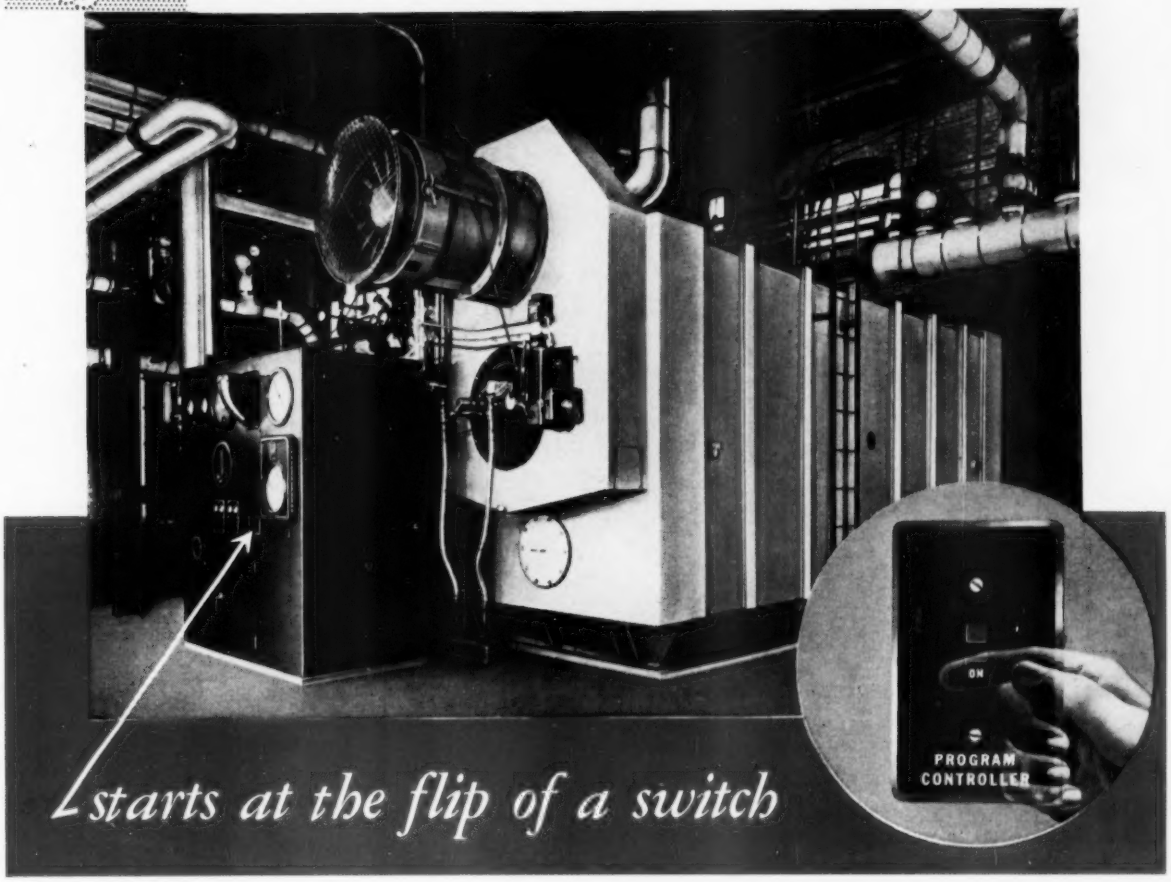
Outstanding feature announced for the Sure-Step Ladder is the non-slip, full width flat step provided to make climbing safer and standing more comfortable. "Safety shoes" at the base of the ladder adapt to any surface or angle, and rubber bumpers at the top hold it securely against walls. Offering a combination of light weight and strength, this aluminum ladder is available in standard sizes in straight or extended sections. A specially installed dielectric barrier offering protection against electrical contact is available on order. (For details circle No. 13 on Reader Service Card.) The Hilton Co.

14—WIRELESS INTERCOM is easily installed system

The Model Twin is a new wireless communophone system, which can be used with two or more stations, with all conversation heard by all stations in the system. In most cases, a station can be located wherever there is a power outlet, and moved from place to place as required. Employing power lines already existing in a building as the transmitting medium and utilizing a line noise suppression circuit in every unit, the system is designed for reliability and quiet operation.

Each station contains a transmitter

shop-assembled Integral-furnace boiler, type FM



Automatic, efficient boiler operation with complete safety is assured by the positive dual control system offered with the B&W FM Boiler.

After the usual service operations are performed —water, fuel, and electric power turned on—a flip of a switch sets the starting program controller in operation and, in a matter of seconds, your FM Boiler is started.

Not only that! During the start-up, your FM Boiler is protected by sensitive safety devices, available with this unit, that automatically shut down your FM Boiler at the first detection of even slight malfunctioning. These electrical "policemen" act faster than an operator in case anything unusual happens—as it sometimes does with any boiler.

After your FM Boiler is started and is up to pressure, an automatic control not only provides fuel feed as required but also proportions fuel and air for best performance, all under control of safety devices.

When load conditions are so light that your FM Boiler must operate below about 25% of rated capacity—always a troublesome condition—an ON-OFF control is available to smoothly and safely start and stop the boiler automatically on the proper cycle to keep steam pressure within desired limits.

Boiler feedwater also is regulated automatically by a sensitive thermo-hydraulic control system which keeps in step with steam demand.

Full details about shop-assembled FM Boilers with steam capacities of 2900 to 28,000 lb per hr are given in Bulletin G-76. Write for it! *The Babcock & Wilcox Company, Boiler Division, 161 East 42nd St., New York 17, N. Y.*

BABCOCK & WILCOX
BOILER DIVISION

G-566

For more facts circle 567 on Reply Card

Control Costs with TOLEDO

On your scale material becomes money!

PRINTWEIGH STOPS ERRORS . . . Provides printed weight records—at the instant of weighing—assuring that the accurate indication of the Toledo dial will reach your accounting records without chance of human error.

Modern Toledos meet your needs today for *rapid, accurate* scales in all phases of production . . . to help you *control costs*!

In providing basic production, receiving, stock or shipping information—the scale is doing an accounting job—on the scale! Every time you weigh, material becomes money! That's why today it is more important than ever to KNOW weights are right—every time.

Check your needs *now*—select Toledo equipment for vital jobs in guarding materials and costs . . . in weighing, counting, testing, batching, force-measuring. Sales and service in 200 cities. Toledo Scale Company, Toledo 1, Ohio.

NEW! FAST!
TOLEDO
SPEEDWEIGH®
Over-Under Scales
Three sizes—5 lb., 20 lb., 50 lb. Wide angle reading; choice of platters and scoops. Write for Bulletin 2110J.

TOLEDO®

HEADQUARTERS FOR SCALES

For more facts circle 568 on Reply Card

NEW PRODUCTS

(Begins on page 120)

and receiver operating at 175 kc, a frequency said to minimize interference with electrical devices. An outstanding feature is the "Silent Watchman" which permits a station to be locked in "transmit" position for continuous listening. Stations are placed in service by simply plugging into a 117-v a-c or d-c outlet —only requirement is that all stations on a system get power from a line fed by a common meter. Intercommunication can be effected over considerable distances and additional stations added as needed. A two-station system is listed at $95.00. (For further information circle No. 14 on Reader Service Card.) David Bogen Co., Inc.

15—STEEL LOCKER keeps clothing well ventilated

The new Air-Flow Steel Locker was developed to meet requirements of a ventilated modern locker room. Circulation of clean, treated air through the locker by means of a ventilating system is designed to remove odors and keep clothing fresh and dry, the direction of air travel being determined by system used. These lockers (two are

pictured) may be recessed in wall or mounted on island bases.

Special features include a louvered, sloping bottom with shoe holder to prevent dirt and trash accumulation inside locker and speed the drying of wet shoes, and a smooth flush-front design and elevated dressing bench. Equipment provided includes a hat holder, storage shelf, coat rod and automatic locking device. (For folder showing installation and ventilation details circle No. 15 on Reader Service Card.) Penn Metal Corp. of Penna.

16—TUBE FITTINGS are designed for better seal

Ermeto Fittings are said to provide a more positive seal than many fittings, and yet require no flaring, threading, welding, soldering, or special tools for installation. The new fitting consists of a sleeve, nut, and tapered body. As the nut is tightened, it forces the sleeve forward into the taper of the body. The leading edge of the sleeve con-

Reserve your copy of this NEW CATALOG—NOW!

You'll find a wealth of valuable information in this new catalog. It gives you complete, up-to-date facts on all the more than 7000 Honeywell industrial controls for regulating temperatures, pressures, humidity, vacuum and liquid level.

To make sure you'll get your copy promptly, just fill out and mail the coupon below.

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Gentlemen:
Please put my name on your list to receive new Catalog No. 8305, "Honeywell Industrial Controls."

Name_____

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Company_____

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City_____ Zone_____ State_____

For more facts circle 568 on Reply Card

Give your clients real circuit protection...

INSTALL AB-I CIRCUIT BREAKERS

Customers know Westinghouse AB-I Circuit Breakers offer outstanding circuit protection for today's needs, for tomorrow's expanding power demands.

Users save because service is restored in seconds after a fault is cleared. Anyone can safely turn the handle to "Reset" and back to "On". If the fault continues, the breaker merely trips again. Downtime is minimized, workmen aren't exposed to "live" parts.

In contrast to other types of circuit-protective devices, AB-I Circuit Breakers require no replacement elements.

On shorts and dangerous overloads, AB-I Breakers trip instantly. Harmless overloads and peaks are carried without circuit interruption. Calibration stays exact and tamper proof for the life of the installation. Trip-free AB-I Breakers cannot be held or locked "On" against a fault.

Easy-to-install AB-I Breakers are available for almost every NEMA application. Call your Westinghouse Distributor or write for B-5456, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-30094

"Of course, circuit breakers save money."

APPARATUS DISTRIBUTOR WESTINGHOUSE

YOU CAN BE SURE...IF IT'S

Westinghouse

AB-I *Circuit Breakers*

THE COMPLETE LINE

For more facts circle 570 on Reply Card

(Begins on page 120)

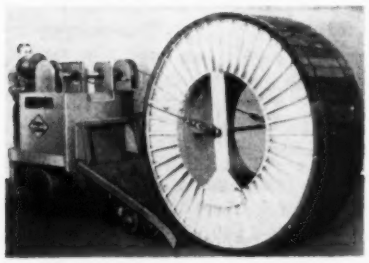
tracts, thus forcing the cutting edge to shear a slight groove into the outer surface of the tubing, to provide a leak-proof joint between fitting and tube. The nut pressing on the bevel of the sleeve results in a tight grip on the tube.

When fully tightened, the sleeve is bowed slightly at mid-section, causing it to act as a lock-washer and this locking action maintains constant tension between body and nut. Once the fitting is assembled, the sleeve becomes attached to the tube, and disassembly and reassembly of fitting can be made without loss of sealing quality, company points out. These fittings are available in carbon and stainless steels, and may be specially ordered in Monel and brass. (For Ermeto Catalog E-1457 circle No. 16 on Reader Service Card.) The Weatherhead Co.

17—PLATFORM TRUCK built for handling large reels

Built for handling reels up to 96 in. dia and weighing up to 20,000 lb, this powered platform truck is equipped with rocking platform and powered winch. In operation, the truck is moved to a reel standing on the floor. Dual cables, connected to the winch on the vehicle, are attached to the pin running through the center of the reel. The winch is used to pull heavy loads onto the platform. As the roll strikes a horizontal bar on the front of the battery compartment, power to the winches is automatically cut off.

Even when the reel is on the truck the platform is fixed in a slightly tilted



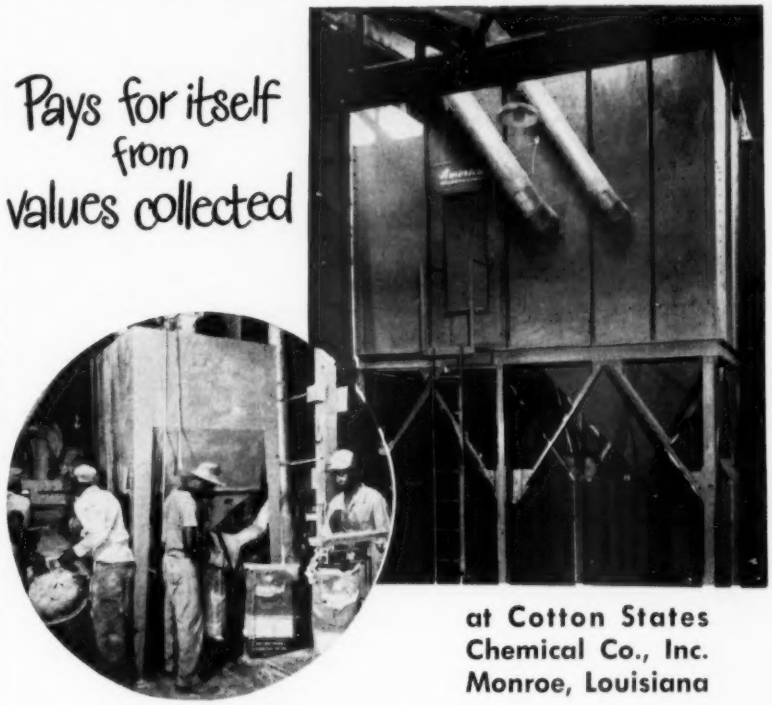
position away from the truck so that when the cable is slackened, the reel rolls easily onto the floor. Thus, the cable always controls the discharge of the reel, and an overload slip clutch on the winch motor is provided to prevent shaft damage. Either power or handwheel steer is available. Truck may be powered by battery or a gas-electric unit. (For further details circle No. 17 on Reader Service Card.) The Elwell-Parker Electric Co.

18—SPIRAL-TAPER REAMER for pipe and conduit use

The Ridgid Spiral 2-S Pipe Reamer cuts inside burr from pipe and conduit clean and fast with minimum effort or

DUSTUBE salvages agricultural chemicals

Pays for itself from values collected



at Cotton States Chemical Co., Inc. Monroe, Louisiana

Three Dustube Collectors are being used by the Cotton States Chemical Co. in the manufacture of Agricultural Chemicals. One Dustube ventilates the work areas around the blenders and "sack-off" stations. A second Dustube ventilates a mill grinding Benzene Hexachloride and DDT. A third Dustube handles exhaust air from a cyclone ventilating a mill grinding concentrates such as toxaphene and aldrin.

"We installed these collectors to regulate the dust in the air, a nuisance to us and our neighbors besides being a fire and health hazard," writes Mr. L. P. Harris, Mgr. "We are paying for the units by the values collected and returned to the products. At least $50.00 worth of material is salvaged per day in the second and third Dustubes and about a third as much in the first. We have been very well satisfied with their efficiency."

The Dustube is the efficient, low-cost way to ventilate chemical processing operations of all types. You will want to read about its 10 advantages in the new catalog, just released. Write today for your copy of catalog No. 372.

American

WHEELABRATOR & EQUIPMENT CORP.

839 S. Byrkit St. Mishawaka, Ind.

dustube COLLECTORS

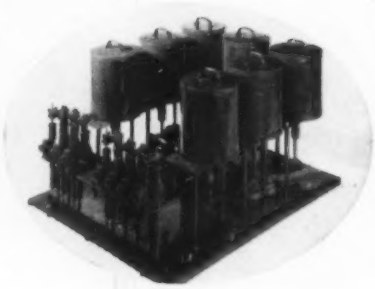
For more facts circle 571 on Reply Card

UTMOST PROTECTION

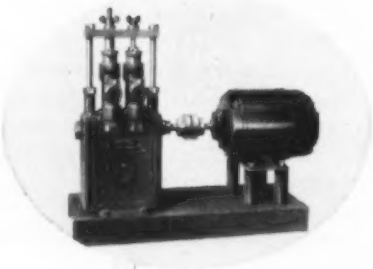
at lowest cost

Manzel CHEMICAL FEEDERS
and HYPOCHLORINATORS

To the cost-conscious operators of industrial plants Manzel Feeders pay dividends in accuracy, dependability, and *surprising* economy of purchase and maintenance. Built by an organization famous for fifty years in the manufacture of automatic force feeding equipment, Manzel design is *thoroughly* proven. Whatever your feeding problem, ask Manzel.

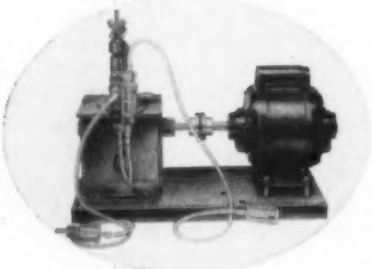


MULTI-FEED CHEMICAL FEEDERS
Any number of pumping units can feed the same or different chemicals simultaneously.



LARGE OR SMALL CAPACITIES
Various models pump from a fraction of a drop to 60 gph. All types of drives are available.

MANZEL HYPOCHLORINATORS
Positive, precise, and *low cost.* Easy to install and service.



Look at these Quality Features

- **Full control** . . . *accurate adjustment from 0 to full feed.*
- **Wide range** *of feed covers nearly every job.*
- **Positive in action** . . . *no clogging.*
- **Sight Feed** *and solution strainer.*
- **Easily adjusted** *while running.*

Manzel

301 Babcock Street, Buffalo 15, N. Y.

For more facts circle 572 on Reply Card

NEW PRODUCTS

(Begins on page 120)

pressure, it is claimed, and the reamer is constructed for long service. The new tool also cuts holes in sheet metal. Its reamer capacity is ⅛ to 2 in. It is furnished with ratchet handle—or the reamer unit alone may be purchased for use in handle of company's No. OOR threader. (Circle No. 7 on Reader Service Card for more information.) The Ridge Tool Co.

19—HAND TRUCK-TRAILER for the palletized loads

This new type of combination hand truck-trailer, the Model A-310-326M is an all-steel caster-steer unit of 4000-lb capacity equipped with a simple brake mechanism designed for easy manual control of the hand truck and load when operating on grades. Its flush deck construction is said to make it especially suitable for hauling pallet loads.

The trailer brakes are the external contracting type, applied by hand-operated lever of the caster-end pipe rack. Self couplers at each end of the unit equip it for trailer duty in trackless-train operations. The standard model hand truck-trailer is 36 in. wide and 62 in. long and the flush deck is 13 in. from floor. (Circle No. 19 on Reader Service Card for additional details on this.) Mercury Mfg. Co.

20—BRAIDED PACKING is designed for more resiliency

Increased resiliency has been imparted to this company's white braided asbestos Teflon impregnated packing by a new type of construction which employs a braided or twisted core of Teflon impregnated glass fiber over which is braided several jackets of asbestos yarn impregnated with Teflon. And this resiliency is said to result in a better seal and longer life, especially significant on high speed centrifugal acid pumps. The new construction provides a packing that's almost rubber like in the larger sizes, company says, and tests indicate it has greater acid resistance. (For data circle No. 20 on Reader Service Card.) Flexrock Co.

21—PORTABLE CONVEYOR has live roller surfaces

The roller surface of this portable conveyor makes the unit suitable for a sorting table. The steel rollers make it easy to move objects carried from side to side or to slide for loading or unloading. The unit can be coupled to company's portable belt conveyor or to another live roller unit. Manufacturer points out that it is customary in the case of an incoming commodity line to have one or more of these units spaced as required between a series of portable belts. (For literature on this conveyor circle No. 21 on Reader Service Card.) Standard Conveyor Co.

(More New Products on page 134)

Engineered "Wool" . . . to keep a baby warm!

Lucky baby!

You can sleep like a top under your soft Dynel blanket. For it's as warm as wool, yet it has properties a sheep never dreamed of . . . and they were engineered into it by modern chemical science. Dynel is strong, flame-proof, mildew- and moth-proof. It's light, and comes from the wash as fluffy as a kitten.

Dynel, Orlon, Dacron, Acrilan, Vicara, and other man-made "wonder" fibers are made from chemical solutions. These raw solutions must be kept absolutely pure as they pass through hundreds of valves that control their flow and regulate their proportions on the way to spinnerets, where these solutions are transformed into gossamer textile fibers. To guard against any contamination or discoloration resulting from valve corrosion, the manufacturers of Dynel and other new synthetic fibers use ALOYCO Stainless Steel Valves.

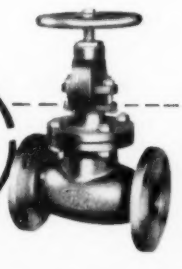
Like the manufacturers of engineered fabrics, other leading chemical firms, handling everything from blood plasma to oil refinery sludge, have brought their problems of corrosion, contamination, discoloration, and extreme temperatures to *Aloyco's Corrosion Engineering Service.* There, in the laboratories of the world's largest specialists in corrosion-resistant valves, the right alloy and the right type of valve have been determined for every specific corrosive situation. In fact, ALOYCO valves go hand-in-hand with chemical progress.

So if corrosives play a part in your business, write to ALOYCO about your own valve needs. Our engineers will be glad to test various alloys under your actual line conditions, and on that basis, recommend the best valve for each particular assignment.

ALLOY STEEL PRODUCTS CO., INC.
1308 West Elizabeth Avenue, Linden, N. J.
Plants: Linden, N. J.; Bloomfield, N. J.; Elizabeth, N. J.

31

Longer Lasting
ALOYCO VALVES
1st in Corrosive Service



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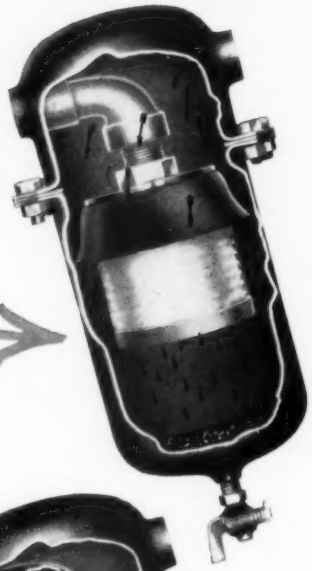
For more facts circle 573 on Reply Card

STAYNEW FILTERS' DOUBLE ACTION

Guards Against Water, Oil and Pipe Scale

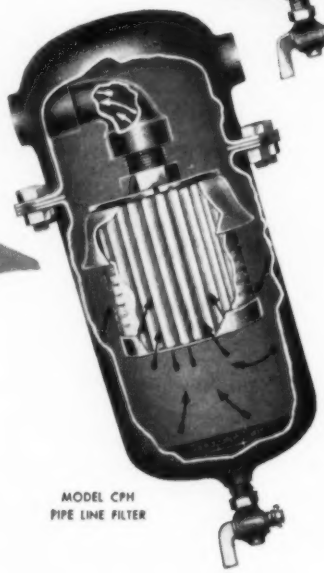
MECHANICAL SEPARATION

1. Deflector cup directs flow of air or gas together with water, oil and dirt to the walls of the housing and then downward at high velocity into the base where liquid and heavier dirt particles are deposited.



FILTRATION

2. Air or gas, having been mechanically cleaned, rises at low velocity through the Radial Finned Filtering element or insert which removes the lighter air-borne material.



MODEL CPH
PIPE LINE FILTER

This exclusive Double-Action principle of Staynew Pipe Line Filters assures sustained, trouble-free operation. Inexpensive, quickly installed and easily maintained, these filters keep air operated or controlled equipment free from pipe scale, dust, dirt, and condensate. Wherever you require air and other gases *clean* and *dry*—demand and get—Staynew Pipe Line Filters.

Write today for complete Staynew Pipe Line Filter Bulletin B-1A.

Representatives in Principal Cities

DOLLINGER PROTECTOMOTOR STAYNEW FILTERS

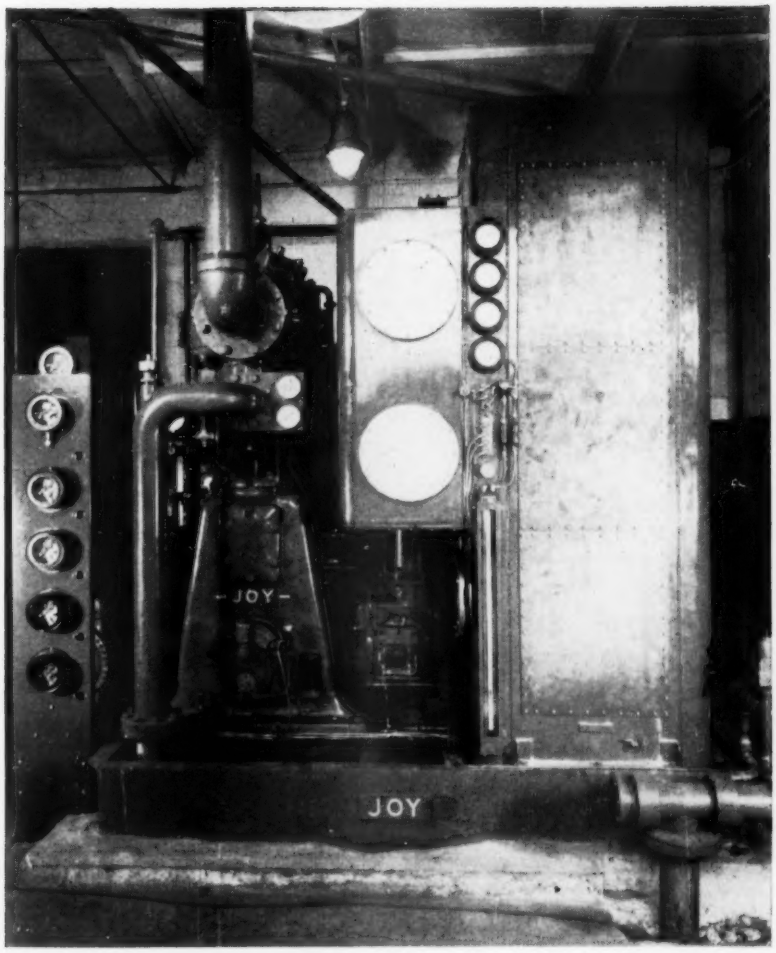
DOLLINGER CORPORATION

55 Centre Pk., Rochester 3, N. Y.

ALL TYPES OF FILTERS FOR EVERY INDUSTRIAL NEED

For more facts circle 574 on Reply Card

Own your own JOY plant for making HIGH-PURITY OXYGEN



"No other way is as cheap!"

WHY depend upon outside sources for your oxygen supply? You don't buy compressed air in bottles or in liquid form —*why oxygen?* Especially when you can produce your own high-purity oxygen with a JOY Generator at a substantial saving—*at least* 50%!

The Joy principle of operation is an exclusive development. It's completely mechanical and automatic . . . no messy chemicals to handle and no residues to remove. The only raw material used is air, and the units are self-cleaning. Operating pressure is low (only 185 psi) and the use of pop safety valves and an automatic shut-off system makes for high inherent safety.

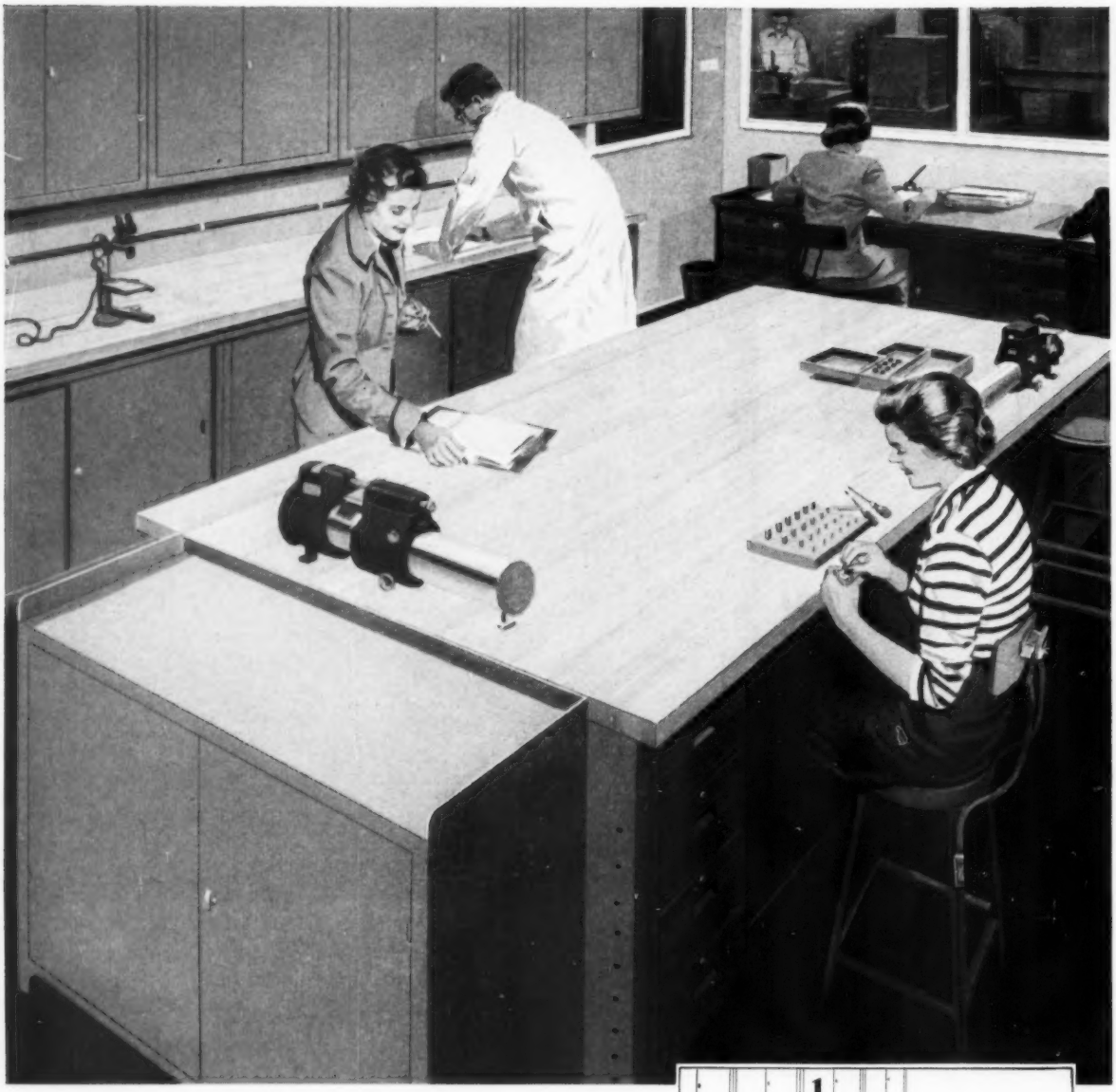
JOY Oxygen Generators are remarkably compact, and as simple to operate as an air compressor. The complete line includes units ranging in capacity from 500 to 12,000 cu. ft. of oxygen per hour at a purity of 99.5 + %. ● For the most economical solution to *your* oxygen supply problems, write us your requirements. Address *Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*

WOD-14218

JOY

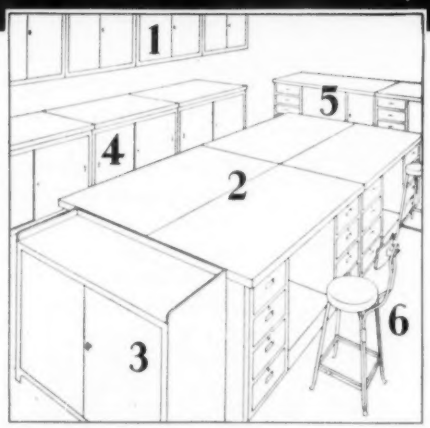
SPECIALISTS IN THE COMPRESSION AND MOVEMENT OF AIR AND GASES SINCE 1885

For more facts circle 575 on Reply Card



A MODERN GAGE ROOM—CUSTOM BUILT with Standard HALLOWELL Shop Equipment

Lay it out as you want it—set it up with standard HALLOWELL Shop Equipment. It's as simple as that to custom build your gage room, laboratory, toolroom or assembly line. Let us send you complete details—then order standard ready-made units from your HALLOWELL distributor. SPS, Jenkintown 26, Pa.



1. Wall Cabinets
2. Cabinet Benches
3. Portable Tool Cabinet
4. Cabinet Benches
5. Multiple Unit Benches
6. Stools and Chairs

Our Fiftieth Year : A START FOR THE FUTURE

HALLOWELL® SHOP EQUIPMENT DIVISION SPS JENKINTOWN PENNSYLVANIA

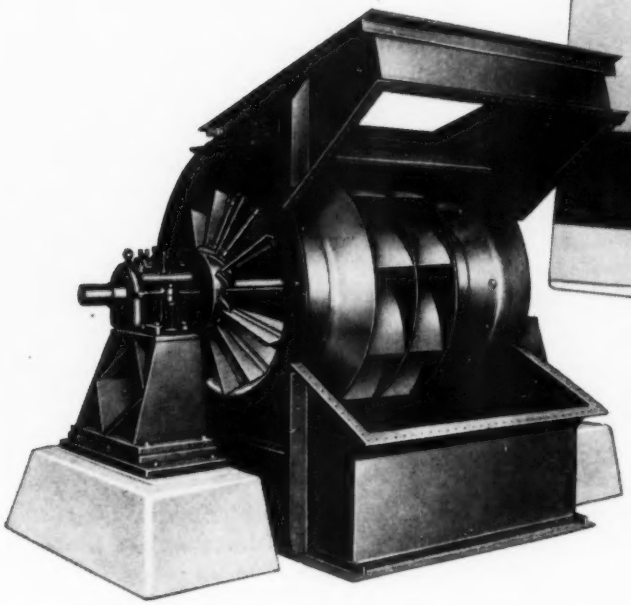
For more facts circle 576 on Reply Card

EVALUATE

THE NEW WESTINGHOUSE

AIRFOIL

CENTRIFUGAL FAN



Recently the Sturtevant Division of Westinghouse introduced another major advance in fan design—the new Airfoil-Bladed Centrifugal Fan. Now, just off the press, is a new catalog describing it in full detail.

Sturtevant's scientific application of Airfoil Blading has produced a new high in efficiency and a new low in noise level. Result:

Peak Efficiency .....90% *plus*
Noise Intensity .....65% *less*

Wherever a lower operating cost means more than first cost—where evaluation and a reasonable price mean more than a low price—the Westinghouse Airfoil, Non-Overloading Fan is the answer.

Get your free copy of Catalog 1320 today. Contact your nearest Westinghouse-Sturtevant office, or write to Westinghouse Electric Corporation, Sturtevant Division, Hyde Park, Boston 36, Mass.

Airfoil Fans Installed or to be Installed at:

Consolidated Edison—Astoria
Consolidated Edison—East River
Duke Power Company—Buck
New York State Electric & Gas Corp.—Greenidge
Pennsylvania Electric Company—Shawville
Tennessee Valley Authority—Kingston-Colbert
Hartford Electric Company—Laurel
Southern California Edison—Redondo
Tucson Gas & Electric Company—Station #3
Gulf States Utilities—Nelson
Squirrel Hill Vehicular Tunnel—Pittsburgh
Kaiser Manufacturing Co.—Detroit

YOU CAN BE SURE...IF IT'S Westinghouse

STURTEVANT DIVISION

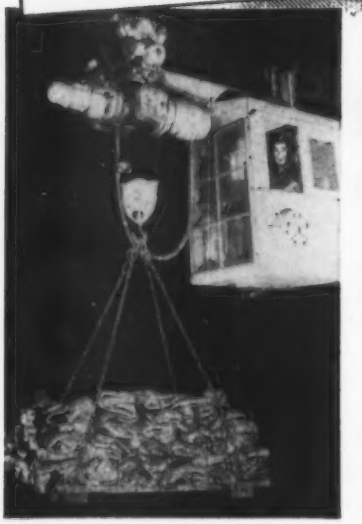
J-80268

For more facts circle 577 on Reply Card

SHEPARD NILES
Floor-Operated Hoist

Operator mainly occupied with other duties. Hoist used for fast, efficient handling of relatively short hauls.

WHICH HOIST is RIGHT FOR YOUR JOB?



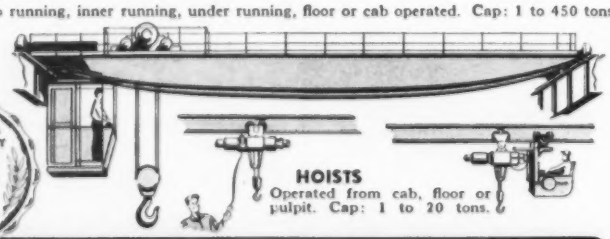
SHEPARD NILES
Cab-Operated Hoist

Operator in cab moves loads along at high speeds—occupies best vantage point for spotting or stacking materials.

Choosing the hoist that's right for your job calls for expert advice.

Let the Shepard Niles representative in your area guide you in your choice. He specializes in through-the-air handling—can help you select the hoist that best fits your job. Write Shepard Niles today for latest bulletins describing both types of hoists—and ask to have a representative stop by your office.

CRANES
Overhead: Top running, inner running, under running, floor or cab operated. Cap: 1 to 450 tons.



50th ANNIVERSARY
SHEPARD NILES CRANE & HOIST CORP. 1903-1953

HOISTS
Operated from cab, floor or pulpit. Cap: 1 to 20 tons.

SHEPARD NILES
CRANE AND HOIST CORPORATION

2225 SCHUYLER AVE., MONTOUR FALLS, N.Y.

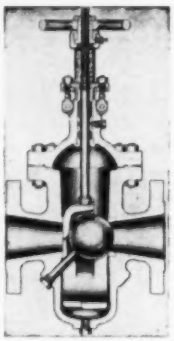
For more facts circle 578 on Reply Card

NEW PRODUCTS

(Begins on page 120)

22—VENTURI BALL VALVE for accurate flow control

Instead of being of conventional shape, the disc in these new Crane-Paul Valves is a ball, which is not directly attached to the stem, but rides in a cage attached to the stem by a tee-head slotted construction. In operation, the ball is moved to and from the center of flow and rolls into and out of the body seat. The ball disc is mechanically locked in the closed position by a wedging member on the cage. In moving to the fully open position, the ball rolls out of the seat and up, until lined up vertically with the stem and carried out of the path of flow.



According to manufacturer, this design provides unusually accurate flow control with a minimum of wire-drawing; straight-through flow with much lower pressure drop than that through a globe valve; tight shut-off; easy operation, and freedom from chattering. The new valves are available in venturi patterns with flanged ends, in cast carbon steel and company's 18-8 Mo alloy steel and in a wide range of sizes beginning at 1 in. (For literature circle No. 22 on Reader Service Card.) Crane Co.

23—MAGNET is designed to prevent cotton gin fires

The Tower Drier is a permanent (non-electric) magnet which acts to prevent fire and machinery damage in cotton gins by removing stray iron from cotton stock. A plate-type unit that pulls tramp iron from thickly matted cotton fibers, it is installed in new or existing tower driers and becomes part of the side of the drier. Or to make installation even simpler, the magnet may be installed in the transition piece following the drier. Material going through the drier impinges on the magnet face—the cotton fibers go on and the ferrous parts stick. Hinges let the unit swing down for easy removal of accumulated tramp iron. These magnets come in three strengths, in 48 in. units suitable for all tower driers. (For more information circle No. 23 on Reader Service Card.) Eriez Mfg. Co.

24—STRADDLE TRUCK, rider type, is electric powered

Both short in length and light in weight, the Warehouser is designed for right-angle tiering in 5- to 6-ft aisles and for operating in elevators and on

NEW FRACTIONAL H.P. MANUAL STARTER HAS *ALL* THE FEATURES!

right:
Class 2510
Basic Starter Mechanism

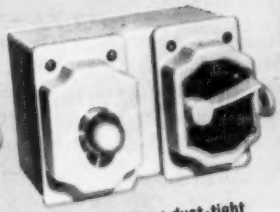
DESIGN LEADERSHIP IN THESE FEATURES:

- ✓ Quick-make, quick-break contact mechanism
- ✓ Single or double pole construction
- ✓ Double break contacts of fine silver
- ✓ Modern styling
- ✓ Straight-through wiring with convenient terminals—generous wire space
- ✓ Dependable melting alloy type overload protection—trip-free
- ✓ Definite trip indication
- ✓ Interchangeable overload relay units accessible from the front
- ✓ Open type starter can be used with standard switch box and flushplate

a Variety of Enclosures

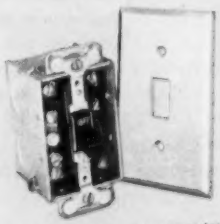
General purpose enclosure—with or without pilot light

Water-tight and **dust-tight** enclosure



Water-tight and **dust-tight** with pilot light

Explosion-resisting enclosure. For hazardous locations—Class I Group D and Class II Groups E, F and G.



Flush mounting. Basic starter mechanism can be used with standard switchbox and flush plate — or with flush plate only for machine tool cavity mounting.

RATINGS

Double pole
1 H.P., 115-230 volts A.C. or D.C.

Single pole
1 H.P., 115-230 volts A.C. and ½ H.P., 115-230 volts D.C.

Write for Bulletin 2510A. Address Square D Company, 4041 N. Richards St., Milwaukee 12, Wisconsin.

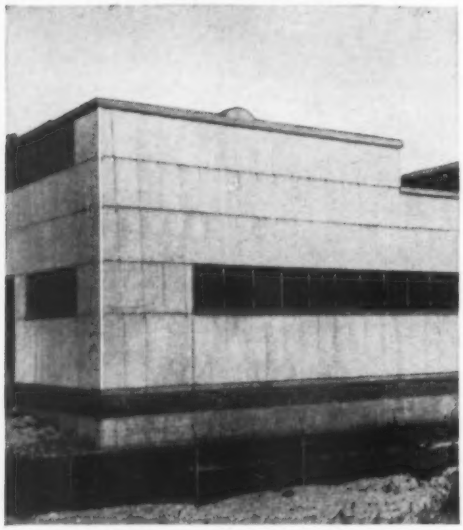
ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY

1903 · 50 YEARS OF DESIGN LEADERSHIP · 1953

CORRUGATED *Asbestos* TRANSITE*

FOR THE FACTORY



Because it is practically indestructible, Johns-Manville Corrugated Transite is extensively used in this plant to provide a durable, trouble-free exterior.

FOR THE FARM

This large barn is typical of the excellent use of Johns-Manville Corrugated Transite on farms where it helps eliminate the threat of loss from fire, destructive rot, and vermin.

You build economically and quickly with these versatile fireproof and weatherproof asbestos building sheets

In the past quarter century, Johns-Manville Corrugated Transite has proven an ideal material for roofs and for sidewalls of industrial, commercial, institutional and agricultural buildings. Made of asbestos and cement, the large sheets are easy to handle, go up quickly with a minimum of framing. Practically indestructible, Corrugated Transite is fireproof, rotproof, weatherproof; needs no paint or special treatment to preserve it; and can be salvaged and re-used if necessary.

The streamlined corrugations and attractive shadow lines of J-M Corrugated Transite have great architectural appeal . . . creating a contemporary effect in keeping with today's growing requirements for functional beauty inside as well as out.

Investigate J-M Corrugated Asbestos Transite and learn how you can build quickly and easily . . . have an attractive, long-lasting, trouble-free structure regardless of size or purpose. For complete details write Johns-Manville, Box 158, Dept. PE, New York 16, N.Y. In Canada write 199 Bay Street, Toronto, Ontario.

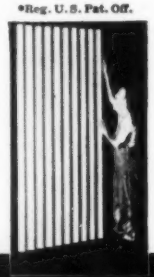
*Reg. U.S. Pat. Off.

EASY TO FASTEN TO STEEL

EASY TO SAW

EASY TO DRILL

EASY TO NAIL TO WOOD



JM **Johns-Manville** *Asbestos* **CORRUGATED TRANSITE**

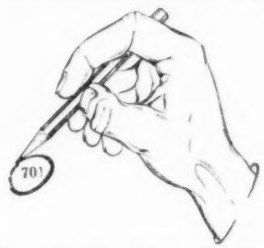
For more facts circle 580 on Reply Card

NEW PRODUCTS

(Begins on page 120)

flooring that will not sustain heavier trucks. This one has three speeds forward, three reverse, with time-delay controls between speeds for smooth acceleration. Available in 2000- and 3000-lb models, it can lift loads as high as 133 in.

The drive consists of a horizontally mounted motor with direct gear drive to splined axle. The steering unit provides a 200 deg steering arc. Power is turned off and brakes applied when the operator leaves the truck. The Warehouser has an airplane-type steering wheel with spinner knob for easy steering. (For information circle No. 24 on Reader Service Card.) The Yale & Towne Mfg. Co.



It's easy to obtain product data with the postage-free Reader Service Cards on pages 37-38 and 167-168. Use them for information on advertised products, too. Just circle the key number appearing at bottom of the ad.

25—FLEXIBLE COUPLINGS "crawl" into the flywheel

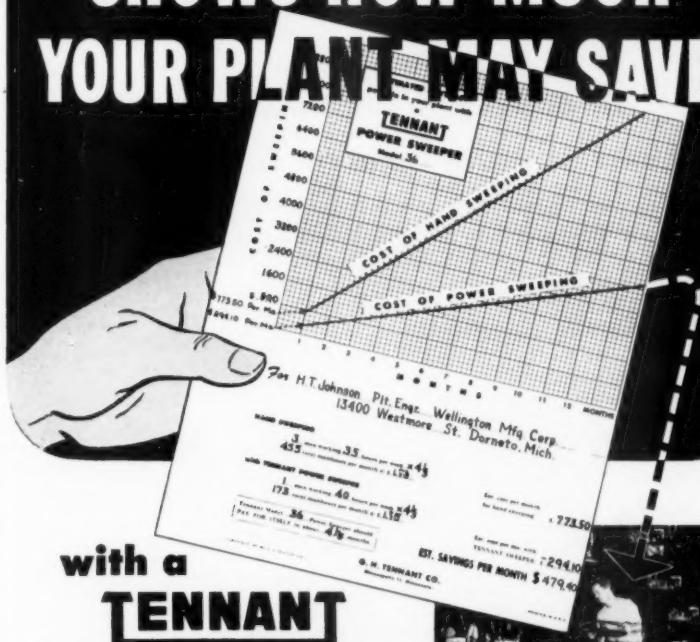
A new modification of this company's Type C Coupling is said to literally "crawl" into the flywheel. It is the standard coupling with one hub cut off. Three or more holes are tapped in the remaining flange, by which the coupling is fastened to the center of the flywheel. Thus by "crawling" into the flywheel itself, this coupling not only saves the space normally taken up by the conventional hub-length, it is pointed out, but also affords cost savings in the elimination of the flange. (For information and blue prints circle No. 25 on Reader Service Card.) Lovejoy Flexible Coupling Co.

26—HANDWHEEL is designed to turn easily, not slip

Although made of malleable iron like company's previous model which it replaces, the new "Non-Slip" Handwheel represents a departure in design. It features four finger-spaced lugs, all continuations of the strong spoke structure, projecting from the stem hub through a rugged octagonal frame. This lets the operator get a firm grip and

Yours for the asking! Free, accurate graph . . .

SHOWS HOW MUCH YOUR PLANT MAY SAVE


TENNANT
POWER SWEEPER
COST OF HAND SWEEPING
COST OF POWER SWEEPING
For H.T. Johnson Plt. Engr. Wellington Mfg. Corp.
13400 Westmore St. Dorneto, Mich.
EST. SAVINGS PER MONTH $479.40
G. H. TENNANT CO.

with a TENNANT POWER SWEEPER

How much do you actually pay for hand sweeping in your plant? And how much *could* a TENNANT Power Sweeper save you?

You'll get answers to these questions in a specially prepared *Cost-Savings Graph* like the one shown above.

It's a frank, conservative estimate of your plant's probable labor savings, based on a personal survey. It's attractive, carefully drawn, sensibly practical. And—it is *free;* no cost or obligation.

OFTEN REPLACES 3 to 12-MAN CREW

If yours is a typical plant, your graph will probably show that one TENNANT Power Sweeper could easily replace a crew of 3 to 12 men with push brooms . . . and would pay for itself in about 90 days or so. Most plants find their savings are in this range. Yours should be, too.

Why not get the facts in handy visual form? You *see*, month by month, the labor savings you'd make with a Tennant Sweeper. *Ask for your FREE GRAPH today.*

EXCLUSIVE FEATURES, such as instant reverse, automotive steering, make it easy to SAVE EXTRA TIME with a Tennant Sweeper. Gas or electric; various sizes.

HAS BIG SWEEPER CAPACITY but is small enough for narrow aisles. A NEW model; speed range 2-8 mph. Pays for itself fast.

Write today FOR FULL DETAILS

TENNANT Established 1870

G. H. TENNANT CO. 2572 N. 2nd Street Minneapolis 11, Minn.

Yes, without cost to us, please estimate our probable savings with a Tennant Sweeper; and send us free COST-SAVINGS GRAPH and details on ☐ Sweeper Bulletins; ☐ gas model; ☐ electric.

NAME_____

FIRM_____

ADDRESS_____

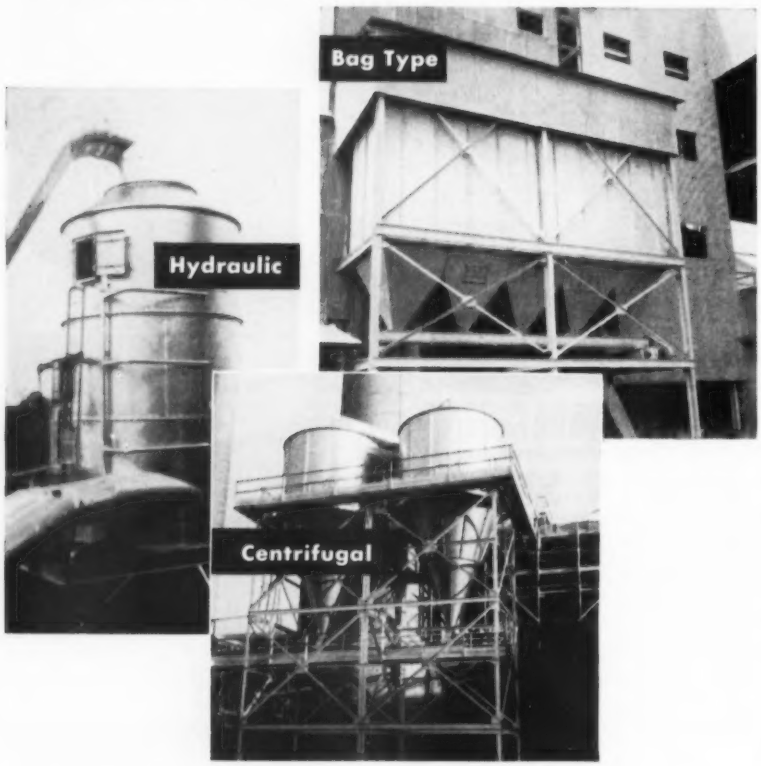
INDUSTRIAL FLOOR MACHINES

CREATORS OF THE TENNANT SYSTEM OF FLOOR MAINTENANCE—MANUFACTURERS OF EQUIPMENT AND MATERIALS FOR MAINTENANCE OF FLOORS, DECKS, ROOFS, HIGHWAYS

Offices in Principal Cities

For more facts circle 581 on Reply Card

Cancel the High Cost of Dust and Fume Damage with Norblo engineered collection equipment . . .



and salvage valuable elements economically!

Dust and fume collection fits into processing and manufacturing *in a big way*. Norblo has helped to implement this valuable aid to safety, health and economy in a big way with outstanding developments in three principal types of collection — Centrifugal, Hydraulic and Bag systems.

Norblo Systems are making new records for high recovery with low operating and maintenance costs. High-efficiency equipment is engineered to include the correct factors to suit your needs and carries the Norblo guarantee of performance. Get the facts on Norblo Dust and Fume Collectors before you decide on any dust or fume collection equipment.

The Northern Blower Company
Engineered Dust Collection Systems for All Industries
6423 Barberton Ave. OLympic 1-1300 Cleveland 3, Ohio

For more facts circle 582 on Reply Card

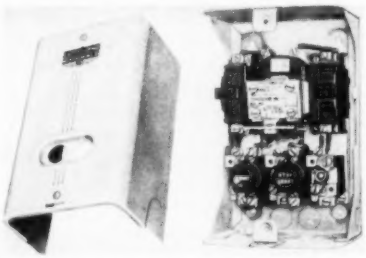
NEW PRODUCTS

(Begins on page 120)

apply high pressure, even though his hands are wet or greasy. The handwheel is shaped to eliminate the possibility of burned hands from contact with the valve stem. And because of the sure grip afforded, the handwheel assures tight closing, it is noted. The handwheel will be standard on company's iron and bronze valves. (For literature circle No. 26 on Reader Service Card.) The Lunkenheimer Co.

27—MAGNETIC STARTERS of simple five-unit design

This new line of magnetic starters, contactors and relays incorporates a five-unit construction designed for easier installation, better performance and longer service. A wrap-around cover pulls off, exposing front and both sides. The five independent parts are: two contact blocks, a magnet coil, an armature and a three-coil or two-coil overload relay mounted on a steel panel. Each part can be removed from the front without disturbing another part. And the complete panel, with all units assembled, can be taken out of the metal case. A typical starter, with cover removed, is pictured.

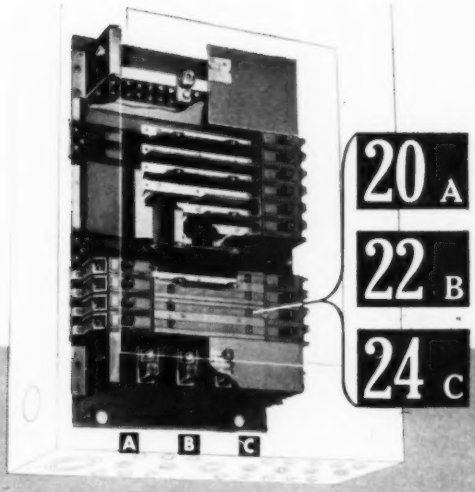


A three-coil, adjustable overload relay permits four ratings from each heater coil by changing its position, it is explained, and the three-coil overload offers better protection against single phasing where unbalanced or unstable line conditions may occur. Terminals are angled to face front and equipped with solderless connectors. The bonderized metal cover and case are finished in grey enamel. (For information circle No. 27 on Reader Service Card.) Cutler-Hammer, Inc.

28—SANDED FORM BOARD for use in in ceiling insulation

Newest insulating product of this manufacturer is sanded form board designed for low exposed ceilings where attractiveness is desired. Made from Fiberglas PF (preformed) insulation, the board also provides an integral part of "poured-in-place" gypsum and lightweight concrete roof desks.

This sanded board is said to combine the advantages of unsanded Fiberglas form board—economy, light weight, fire safety, low heat transmission and good noise absorption—with a more pleasing appearance. The older product is de-



Circuit breaker panelboards, of course, but...

Westinghouse permanent phase identification saves installation and maintenance time

Westinghouse Panelboards provide modern, labor-saving control of lighting and appliance branch circuit power distribution, electrically and mechanically.

For instance, no guesswork is required to determine the connections between branch circuits and main bus on standard 3-phase, 4-wire lighting Panelboards. Each circuit and the bus to which it is connected is clearly, permanently identified. Eliminates time-consuming ringing-out of circuits. Simplifies installation, wiring or rewiring for future circuit changes.

For the quality that delivers power effectively, cuts outage time, speeds installation and maintenance, look to Westinghouse Factory Assembled Panelboards.

More facts? Call your Westinghouse Distributor, or write for DB-30-930, Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pennsylvania.

J-93476

YOU CAN BE SURE...IF IT'S Westinghouse

APPARATUS DISTRIBUTOR WESTINGHOUSE

"DE-ION" BREAKER PANELBOARDS

For more facts circle 583 on Reply Card

Yes, that's a strong promise. But it's being done right now in plants like yours. Here's how:

Match the requirement of your job with a custom-built Reading crane at no extra cost

Imagine, at what you'd normally pay for an "ordinary" crane, you can actually have one "tailor-made" for your own plant. For when you order a READING CRANE, our engineers offer you a choice of several interchangeable motor, trolley and hoisting units.

Known as UNIT CRANE DESIGN, this unique construction method assures greater operating efficiency. It enables you to move more materials at the lowest possible cost. And it helps you reduce maintenance time and save maintenance dollars—any unit can be removed for overhauling or repair without dismantling any other unit!

READING CRANE & HOIST CORPORATION 2103 Adams St., Reading, Pa.

READING CRANES

CHAIN HOISTS | OVERHEAD TRAVELING CRANES | ELECTRIC HOISTS

For more facts circle 584 on Reply Card

NEW PRODUCTS

(Begins on page 120)

signed primarily for high ceiling uses.

Besides its better appearance when unpainted, the sanded board affords a surface better adapted to painting. It becomes a permanent form for the roof deck. Standard size is 32 by 48 in., 1¼ in thick. (For information circle No. 28 on Reader Service Card.) Owens-Corning Fiberglas Corp.

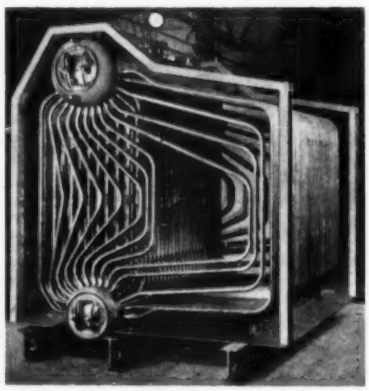
29—FLEXIBLE TUBING is low priced, has many uses

Flexflyte Green Label is intended for air handling, fume removal and dust collection, and be used in exhaust, blowing or gravity systems. Made of a rust-resistant wire helix covered with woven fabric coated with a tough resinous compound, Flexflyte Green Label is a light weight tubing with a relatively smooth bore and negligible reduction of cross-sectional area in tight bends. Company says it has good resistance to oils, gases, acids, alkalis and abrasion; it has good aging qualities and is flame resistant.

The tubing is stocked in 50-ft lengths, from which shorter lengths can be cut. Soft cuffs can be produced by removing part of the supporting wire helix at each end. It comes in diameters of 1 to 2½ in. (Circle No. 29 on Reader Service Card.) Flexible Tubing Corp.

30—WATER TUBE BOILERS are ready for installation

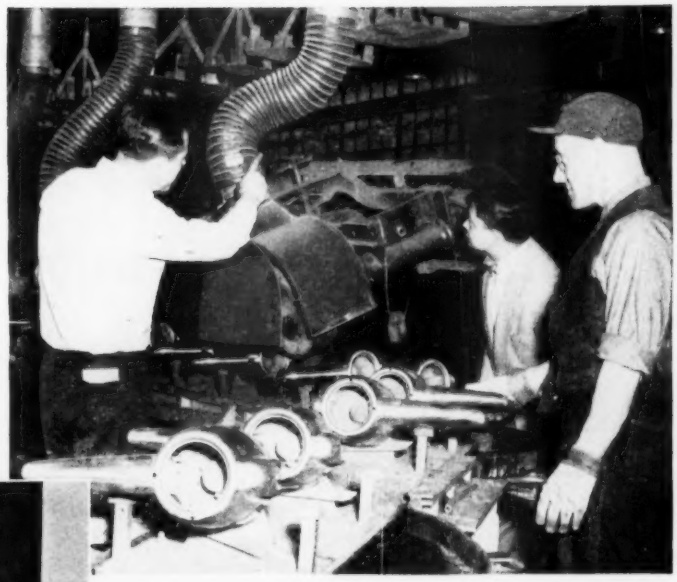
This new standard line of package type boilers covers sizes from 7500 to 30,000 lb of steam per hour (or equivalent water ratings) and in design pressures of 200, 300, 600 and 900 psig. All are of two-drum, bent tube design with water cooled furnace in which tangent



water tubes completely shield the full length combustion chamber. Large water capacity is credited with giving the boilers exceptional ability in handling heavy peak and fluctuating loads. Provision for superheat is available.

Firing is by oil or gas or combustion burners, and units are offered with or without burner and control assembly. The boilers are enclosed in an insulated

Whether
DUST REMOVAL
or
MATERIALS HANDLING



You can install SPIRATUBE® yourself

Whether your application requires dust removal . . . or materials handling . . . you can set up your lines of SPIRATUBE to meet your requirements. AND . . . what's more important – you can do it yourself. That cuts downtime to a minimum, and enables you to keep your ducting system in operation to meet your production needs.

SPIRATUBE – the new type flexible tubing – connects quickly, easily to your present lines . . . and bends anywhere with minimum crimping. No turn is too short, no angle too acute. No elbows or special fittings to bother with in going around obstructions!

And – important to you too: The initial cost of SPIRATUBE is small . . . and its life equals – sometimes exceeds – rigid ducts.

Standard sizes for all requirements are immediately available from well-stocked distributors – coast-to-coast.

FOR ALL DUCTING SYSTEMS: **FLEXFLYTE®** **SPIRATUBE®** **AYRTUBE®**

Flexible Tubing
CORPORATION

Guilford, Connecticut **Pasadena 1, California**

FREE! Full details on this amazing, cost-saving ducting. Fill in coupon and mail

FLEXIBLE TUBING CORPORATION **Dept. PE-2, Guilford, Conn.**

Please send me your new catalog on Flexible Tubing products.

My application is _____

Name _____ Title _____

Company _____

Address _____

City _____ State _____

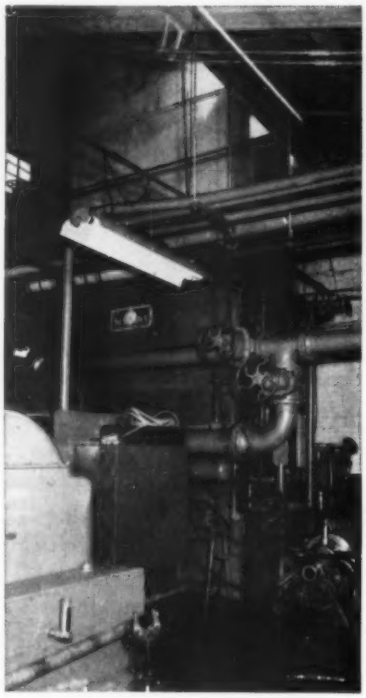
For more facts circle 585 on Reply Card

You Get Trustworthy Liquid or Gas Cooling With Great Cooling Water Savings from the NIAGARA AERO HEAT EXCHANGER

● You can cool air, gas, water, oils, chemicals, electric and power and process equipment, engines, mechanical processes with lower cost and really accurate control of temperature with the Niagara Aero Heat Exchanger.

You are assured of uniform, constant production and quality from any process . . . steady, reliable operation . . . lower cost for more dependable cooling. You can have closed system cooling with freedom from scale, dirt, corrosion and maintenance troubles. You can accurately cool more than one type of liquid with one machine.

The Niagara Aero Heat Exchanger uses atmospheric air to cool liquids and gases by evaporative cooling. You can remove heat at the rate of input to keep accurate control of gas or liquid temperature. You can put heat back into the system to save the losses of a "warm-up" period or to equalize the effect of load variations.



Great savings in cooling water and savings in piping, pumping and power return the cost to you quickly. The Niagara Aero Heat Exchanger can save you approximately 95% of your cooling water cost. Write for Bulletin 96.

NIAGARA BLOWER COMPANY

Over 35 Years Service in Industrial Air Engineering

Dept. PE, 405 Lexington Ave. New York 17, N. Y.

Experienced District Engineers in Principal Cities of United States and Canada

For more facts circle 586 on Reply Card

NEW PRODUCTS

(Begins on page 120)

steel jacket of sectional design and suitable for outdoor as well as indoor installation. Normally they're shipped assembled ready for connection to fuel and service lines. However, the boilers' sectional casing and standardized sectional parts permit field assembly when necessitated by limited wall openings. (For literature circle No. 30 on Reader Service Card.) Springfield Boiler Co.

31—PUSHER speeds fork truck handling of bulky loads

This load-pusher attachment for fork trucks is designed to speed the handling of bulky unpalletized loads such as baled scrap, paper or textiles, and to permit loading of highway carriers unable to accommodate fork trucks because of floor load capacities or low overheads. The new pusher lets fork truck users pick up, haul and unload bulky loads without manual handling. In the unit-loading of highway carriers, the operator pushes loads into the carrier without entering it, first-in loads being moved forward in the carrier by the loads that follow.

In this attachment positive control over pushing pressure is available from the driver's position, through the use of a metering valve. Distance from fulcrum point to pusher face is less than other attachments of this type, manufacturer points out, and this permits greater payload capacity and load stability. The pusher is available on lift trucks in 2000- to 6000-lb capacities. (For details circle No. 31 on Reader Service Card.) The Baker-Raulang Co.

32—INDUSTRIAL METER for handling corrosive liquids

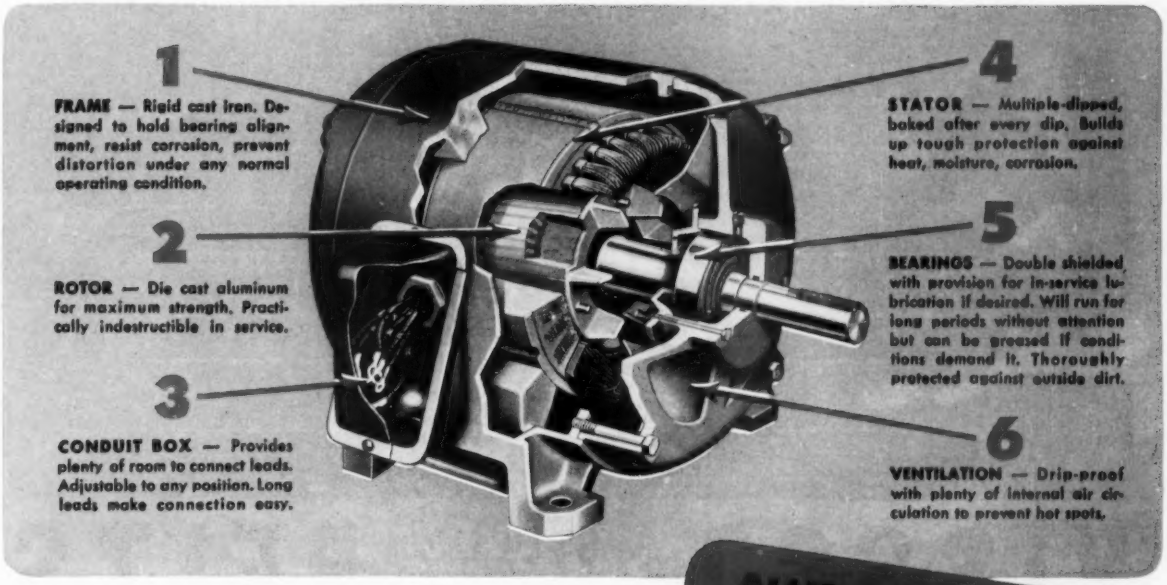
The new 2 BC Rotocycle Stainless Steel Industrial Meter is designed to handle corrosive liquids common to the cellulose, chemical, confectionery, food, pharmaceutical and other processing fields. A rotary displacement meter, it features a maximum capacity of 100 gpm at a working pressure of 125 psi. All materials in contact with corrosive liquids are of stainless steel.

Remote registration, a quantity control register, swivel adapters, angle adapters and register extensions can be supplied. The meter weighs 120 lb without registering accessories. (For literature circle No. 32 on Reader Service Card.) Rockwell Mfg. Co.

33—FASTENER for joining, repairing conveyor belts

A new and improved drive-on conveyor belt fastening, the Turtle is made for repairing rips in conveyor belts 3/8 to 9/16 in. thick and for joining medium duty conveyor belts 7/16 to 9/16 in. thick. With it, gaping openings in the belt between the plates are eliminated, company says, and it isn't necessary to pre-punch holes to guide the teeth.

Look for These 6 Signs of Good Motor Design


1
FRAME — Rigid cast iron. Designed to hold bearing alignment, resist corrosion, prevent distortion under any normal operating condition.
2
ROTOR — Die cast aluminum for maximum strength. Practically indestructible in service.
3
CONDUIT BOX — Provides plenty of room to connect leads. Adjustable to any position. Long leads make connection easy.
4
STATOR — Multiple-dipped, baked after every dip. Builds up tough protection against heat, moisture, corrosion.
5
BEARINGS — Double shielded with provision for in-service lubrication if desired. Will run for long periods without attention but can be greased if conditions demand it. Thoroughly protected against outside dirt.
6
VENTILATION — Drip-proof with plenty of internal air circulation to prevent hot spots.

Get Allis-Chalmers Motors for these Extra Values!

ALLIS-CHALMERS MOTORS

Certified Service — Nearly 100 Allis-Chalmers Certified Service Shops provide factory-approved parts and service on your Allis-Chalmers motors. Screened for modern equipment, adequate experience and business integrity, these independently owned service shops will provide you with prompt, economical repair and maintenance.

Complete Drives from One Source — Allis-Chalmers can supply your complete drive — motor, control and *Texrope* V-belt drive — from one convenient, reliable source.

Application Engineering — Your Allis-Chalmers District Office representative or Authorized Dealer will be glad to help you select exactly the right motors for your needs. For additional information, write Allis-Chalmers, Milwaukee 1, Wisconsin, for Bulletin 51B6052. A-3954

Texrope is an Allis-Chalmers trademark.

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Distributors, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE V-belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

PUMPS — Integral types from ¾ in. to 72 in. discharge and up.

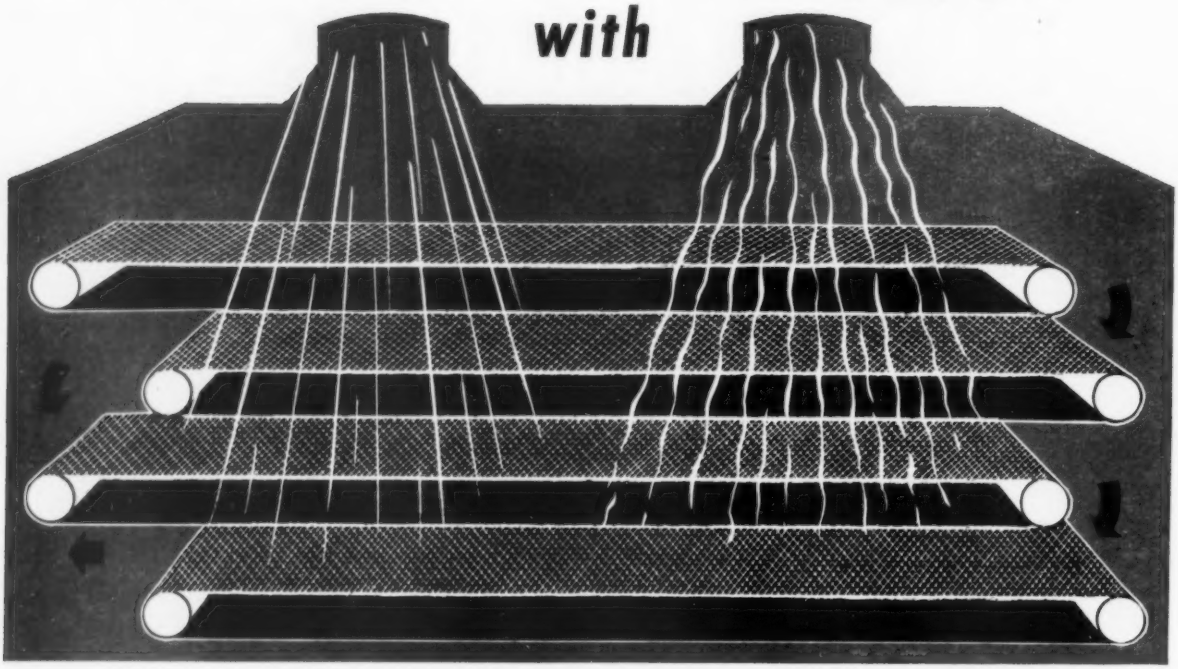
ALLIS-CHALMERS

A-C ALLIS-CHALMERS

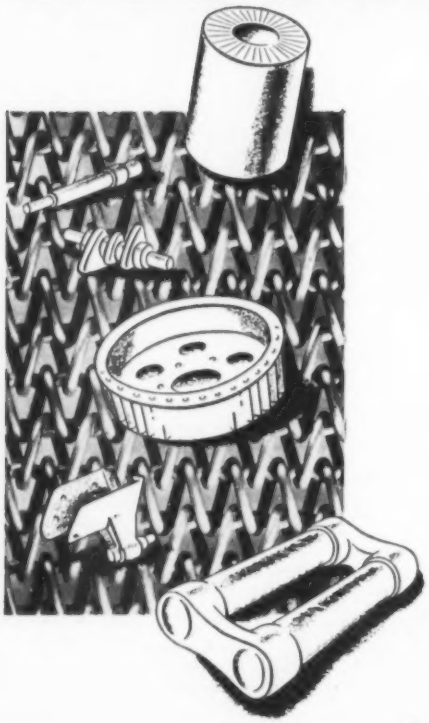
For more facts circle 587 on Reply Card

SAVE TIME...SAVE MONEY

on air cooling or air drying jobs with



WISSCO STEEL PROCESSING BELTS



If your processing involves air cooling or air drying, it will pay you to investigate the big savings Wissco Belts can give you by converting time-consuming batch operations into fast, efficient, continuous straight-line production.

With Wissco Belts you get these advantages:

- **Maximum air circulation either hot or cold, any velocity or volume, because of wide open balanced spiral weave.**
- **Corrosion resistance of stainless steel.**
- **High loading capacity because of strong, steel construction.**
- **Simple, low-cost installation; and economy of continuous straight-line operation.**

To order, write or call our sales office at 56 Sterling St., Clinton. Mass., or contact our nearest district office.

THE COLORADO FUEL AND IRON CORPORATION–Denver, Colorado
THE CALIFORNIA WIRE CLOTH CORPORATION–Oakland, California
WICKWIRE SPENCER STEEL DIVISION–Atlanta, Boston, Buffalo, Chicago, Detroit, New York, Philadelphia

WISSCO BELTS

PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION

CF&I

For more facts circle 588 on Reply Card

NEW PRODUCTS

(Begins on page 120)

This improvement is made possible by forming the teeth slightly outward.

The Turtle comes in one size only—its plate length of three teeth on each side (two long and one short) permits the minimum number of plates to be used with maximum strength of joint. A mechanic's hammer is all that's needed to install the Turtle, and repairs can be made on the job. Fasteners are available in steel, stainless steel, Monel and Everdur. (For Bulletin T-600 circle No. 33. on Reader Service Card.) Flexible Steel Lacing Co.

34—PORTABLE WASHSTATION holds cleanser and towels

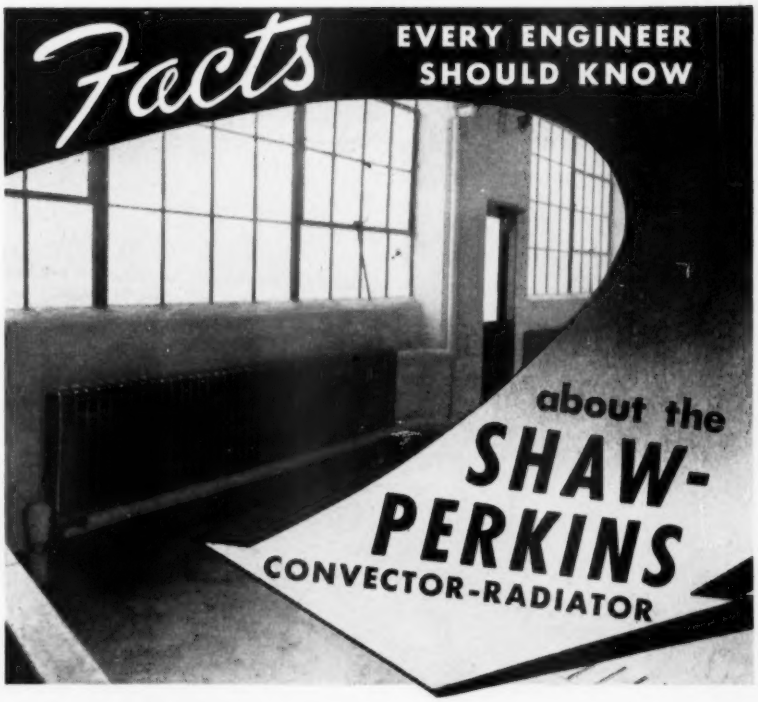
Expected to save worker off-the-job time, the SBS Waterless Washstation dispenses the correct amount of SBS-30 Waterless Skin Cleanser to the user, provides for paper towels to remove cleanser and grime and serves as receptacle for waste towels—all in one unit. Its base is a heavy gage steel receptacle enclosing a removable canvas waste towel receiver. Its turret top holds two paper towel dispensers and the skin cleanser dispenser.

The washstation is finished in green enamel, with the cleanser dispenser in satin finished aluminum. The unit needs no plumbing, can be bolted down, or not, as desired. It can be set up anywhere in the plant, relocated as required. Cost of the unit is announced as approximately $50.00. (For details circle No. 34 on Reader Service Card.) Sugar Beet Products Co.

35—SILICONE RUBBER, flexible at low temperatures

A new silicone rubber that remains flexible at -120 F and can be produced with uniform high quality is announced. Designated SE-550, this medium durometer rubber is expected to have wide application for gaskets and seals on fuselage equipment of aircraft, also wire insulation on ignition systems of arctic ground equipment.

SE-550 is said to outperform other silicone rubbers at any low temperature while still retaining heat resistance up to 500 F. Company says it is easily worked by rubber fabricators, mills and extrudes easily and has good tear strength. It can be colored with a wide range of heat-stable pigments. SE-550 is available in compound form; manufacturer plans to market gum for producing this compound to rubber fabricators later this year. (For information circle No. 35 on Reader Service Card.) General Electric Co.



CHECK THESE *Points*

- USE LESS PIPING
- LOW PRESSURES NOT REQUIRED
- HIGH HEAT EMISSION
- NO SEDIMENT
- NON-RUSTING
- PRESSURE SAFE
- LOW SURFACE TEMPERATURES
- EVEN HEAT—NO AIRBLAST
- LOW-COST INSTALLATION
- WALL OR CEILING MOUNTED

Shaw-Perkins Convector-Radiators are designed to operate on steam pressures up to 150 psi. A separate low pressure piping system is not necessary. Units are small, light in weight, and compact. Simple, low cost wall or ceiling installation saves valuable plant space. Straight flow with a positive pressure differential prevents accumulation of sediment and insures efficient trap operation. Annual clean-out not necessary.

Shaw-Perkins Convector-Radiators offer complete safety, comfort, and cleanliness. Units are actually tested at 3500 psi hydrostatic pressure. Large surface areas provide modulated, comfortable heat with no annoying air blast—no carbonization of dust particles. Units are also applicable to forced circulation hot water as well as to low pressure steam systems. Range of sizes to meet every need. *Check with Shaw-Perkins for the finest industrial heating available!*

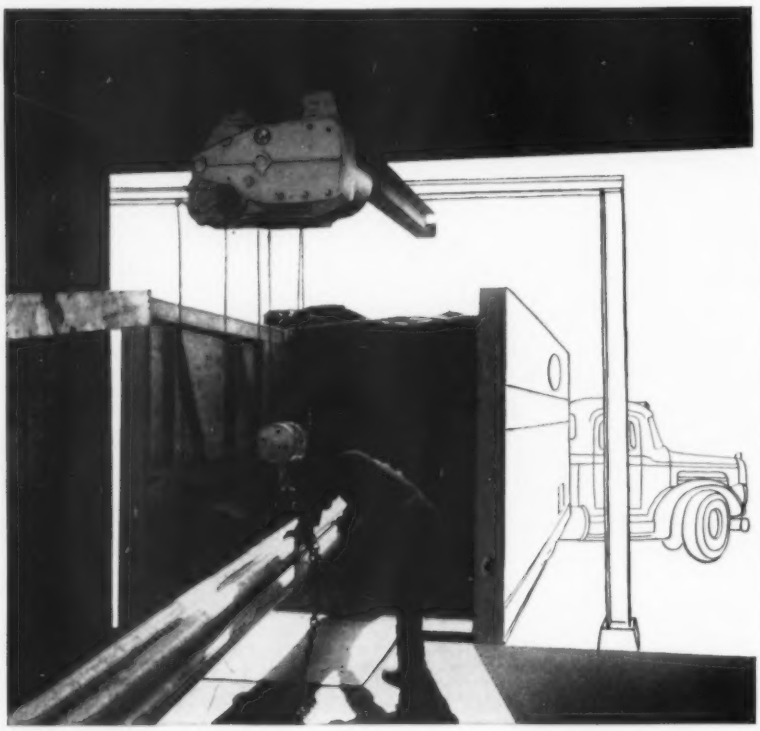
SP
Specialists in INDUSTRIAL HEATING *Since 1927*

SEND IN THIS COUPON FOR FULL INFORMATION

SHAW-PERKINS MANUFACTURING CO.
203 East Carson Street., Pittsburgh, Pa.
Please send me full technical and descriptive literature on Shaw-Perkins Convector-Radiators.
Name ..... Title .....
Company .....
Address .....
City ..... State .....

For more facts circle 589 on Reply Card

COMMERCIAL MOTOR FREIGHT, INC.



EQUIPPED SIX TERMINALS WITH R & M HOISTS

— to help their more than 1150 vehicles maintain daily direct service to 560 communities in Ohio, Indiana, Kentucky and West Virginia. The heart of each of Commercial's "steel dock" installations is a tough, efficient, five-ton capacity Robbins & Myers F-90 steel hoist. These hoists go right out over the trailer body to get their load, and transfer it direct from an incoming trailer to an outbound trailer on the opposite side of the dock. Even though the hoists are not in continuous use, it more than pays to have them, according to Commercial's Assistant Vice President of Operations, Mr. S. M. Bostic, who says: "We have steel docks equipped with R & M hoists at our terminals for three major reasons. First, for personnel safety; second, for protection of heavy freight items; and third, as insurance of our ability to handle, efficiently, loads of sheet steel, bar stock, pipe, structurals, castings and machinery." The installations at Commercial Motor Freight help prove that the extreme versatility of R & M hoists make even occasionally used installations profitable. R & M Bulletin No. 801-C describes the "F" series hoists. Write for your copy today. No obligation.

TAKE IT UP WITH

ROBBINS & MYERS INC

MOTORS HOISTS CRANES
FANS MOYNO PUMPS

HOIST AND CRANE DIVISION, SPRINGFIELD 99, OHIO

For more facts circle 588 on Reply Card

NEW PRODUCTS

(Begins on page 120)

36—PRESSED PLYWOOD made for concrete form work

The 4- by 8-ft panels of Presdply have a core of plywood and faces of specially-tempered Presdwood. The panels are said to combine the surface characteristics of Presdwood—hardness, smooth grainless surface, strength, and moisture resistance — and the structural qualities of the thicker plywoods. Like other members of company's concrete form line, Presdply is designed to produce grainless, smooth concrete at low cost. The panels come in thicknesses of $\frac{5}{8}$ and $\frac{3}{4}$ in.

Combining sheathing and lining in one material, Presdply may be re-used a number of times. The panels are easily handled, company says, and their surfaces won't split, splinter or crack. (For further data circle No. 36 on Reader Service Card.) Masonite Corp.

Further details on any product are available without cost or obligation. Circle item numbers on Reader Service Cards on pages 37-38, 167-168.

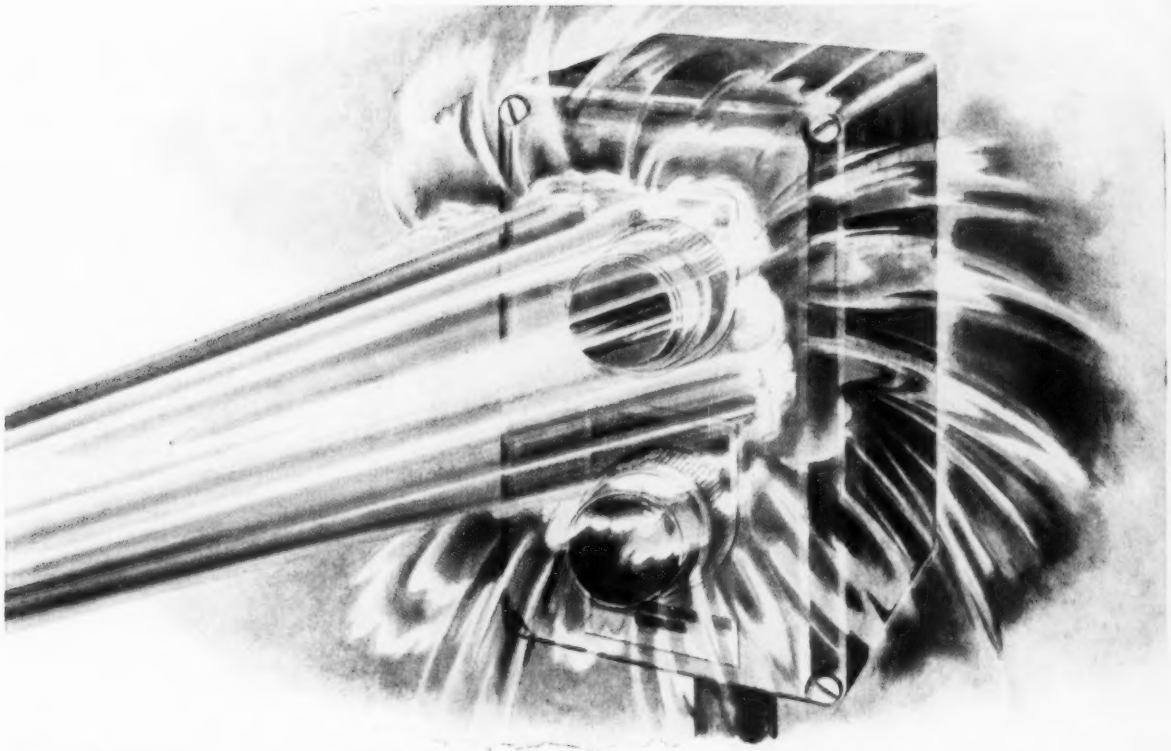
37—SMALL HAND TRUCKS get around in tight spots

The Utility Truck was especially designed to move odd size boxes, crates, cans, machinery, etc., through narrow openings and small aisles. Its platform is of one-piece sheet steel with sides turned at right angles to $1\frac{3}{4}$-in. Size of pan is 20 by 30 in. Casters are 3-in. all hard rubber wheels, two to swivel with ball bearings and two stationary. These casters are bolted in the pan and easily removable for repair or replacement. The small size of this truck lets it be used where larger trucks can't operate. (Circle No. 37 on Reader Service Card.) Muckle Mfg. Co.

38—CLEANING UNIT operates on low pressure steam

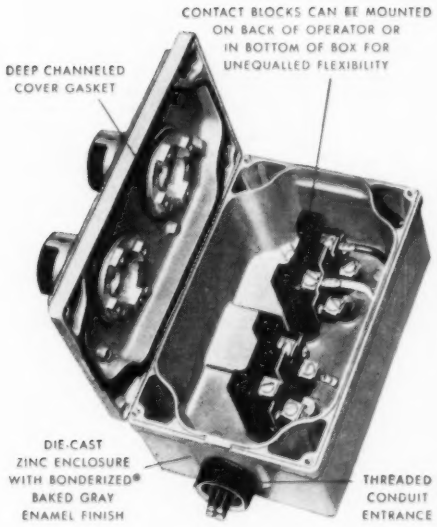
The Booster Jet is offered to give plants with low pressure steam facilities the advantages of the hydraulic jet cleaning method. This unit operates on ordinary cold water and plant steam of from 5 to 25 psi. It is designed to convert 5 psi inlet steam pressure to 100 psi discharge pressure, and this increase ranges to 200 psi discharge pressure resulting from 25 psi inlet steam.

In operation, a solid stream of hot water, containing detergent up to 25 per cent of the total volume, with temperatures of 160 to 210 F, under pressure of 100- to 200-psi, is propelled with controlled cannon-like force. Company says the resultant impact removes all dirt, grease and stubborn matter from walls, floors and equipment. Length of



User's test proves Westinghouse pushbuttons

stop "Aquajet*" Water Stream 300 psi at 3 feet


CONTACT BLOCKS CAN BE MOUNTED ON BACK OF OPERATOR OR IN BOTTOM OF BOX FOR UNEQUALLED FLEXIBILITY
DEEP CHANNELED COVER GASKET
DIE-CAST ZINC ENCLOSURE WITH BONDERIZED® BAKED GRAY ENAMEL FINISH
THREADED CONDUIT ENTRANCE

"We have subjected Westinghouse Pushbutton Controls to multiple tests in our own plant—found them highly satisfactory, and are installing them in our new Atlanta plant," says Kraft Foods Company.

"Tests consisted of directing a stream containing chlorides and detergents from an 'aquajet' cleaning device, 300 psi**, 175° F, at a distance of three feet—onto the face of the pushbutton units—at the gasket seal, mounting holes and other points, for a minimum of 10 seconds at each location. Westinghouse Controls have conclusively proved themselves moisture tight."

In thousands of installations, Westinghouse Oil-Tite® Controls provide unflagging protection against oil, coolant, cutting compounds and water. Maximum unit flexibility for virtually any desired mounting or station combinations.

Contact your Westinghouse representative or write for Booklet DB 15-022, Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa.

J-30070

YOU CAN BE SURE...IF IT'S

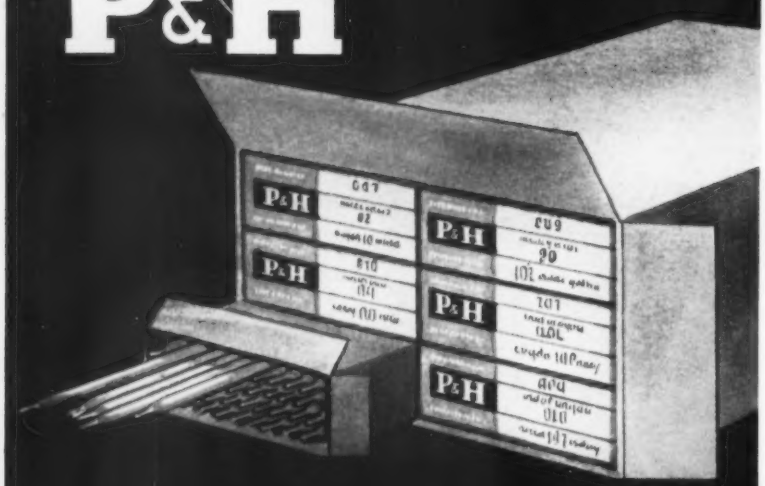
Westinghouse

OIL-TITE CONTROL STATIONS

* (C) Lynn Mfg. Co.
** Pounds per square inch

For more facts circle 591 on Reply Card

P&H



economical

Handy, small-package assortment of electrodes for repair and maintenance welding

7 different electrodes
(Approximately 27 lbs.)

- ★ AC-3, 1/8", 5/32", 3/16" — For all position welding of mild steels and sheet metal. AC or DC.
- ★ AC-1, 5/32" — For mild steels. AC or DC.
- ★ 70LA2, 5/32" — For high-carbon, alloy, high-sulfur, free-machining, cold-rolled, and other hard-to-weld steels. Ideal for steel casting repairs. AC or DC.
- ★ Harstain, 1/8" — For spring steels and stainless steels of all kinds. AC or DC.
- ★ Nicast, 1/8" — For machinable welds on cast iron. Nicast welds are strong and non-porous.

$13.90
for complete assortment

P&H
Maintenance Pack

Why buy seldom-used electrodes in quantities larger than you need? Now, in one convenient package, you can keep some of each type on hand economically — and get replacement packages as you need them.

The P&H Maintenance Pack equips you to do all kinds of repair and maintenance jobs with the *right* electrode. All rods are packaged to stay dry — and are clearly labeled to make selection easy.

Be ready for emergencies. Save time, trouble, money. Order a P&H Maintenance Pack from your P&H representative or local distributor. If you don't know who he is, write for his name.

P&H WELDING DIVISION
HARNISCHFEGER CORPORATION
4696 West National Ave., Milwaukee 46, Wis.

the P&H *Line*

2497

For more facts circle 592 on Reply Card

NEW PRODUCTS

(Begins on page 120)

the jet is manually controlled to extend up to 30 ft, removing soil from inaccessible machinery parts. Requiring no fuel, or electricity, and producing no injurious fumes, the Booster Jet is claimed to provide the safest and most economical cleaning method for any plant with less than 50 psi steam. (For details circle No. 38 on Reader Service Card.) Sellers Injector Corp.

39—FLOOR COATING is both decorative, protective

Colorflex Plus AWA is said to resist the alkali content of cement, be unaffected by storage battery acid, lactic acid, fruit or vegetable acid, and not softened by water, mineral oils, grease or gasoline.

This coating is suggested for use on practically all inside- or outside-surfaces in food plants, factories, garages, laundries, engine rooms, washrooms and offices. Its penetrating resin base makes it a good choice for painting concrete, and it's claimed to do a superior sealing and coloring job on wood, brick, composition and other surfaces. Red, gray, brown, green and clear colors are available. (For folder on Colorflex Plus AWA circle No. 39 on Reader Service Card.) Flexrock Co.

40—SWITCH ASSEMBLY is small, multiple rotary

Although designed especially for aircraft use, these multiple rotary switch assemblies are adaptable to a wide variety of either a-c or d-c switching applications. Among the most popular of the series is a ganged assembly of seven of company's V3 type basic switches with single-pole double-throw contact arrangement. Each V3 basic switch measures only $\frac{13}{32}$ by $\frac{5}{8}$ by $1\frac{5}{32}$ in., and the entire assembly measures only $1\frac{1}{2}$ by $1\frac{5}{8}$ by $4\frac{3}{4}$ in. Variations of this assembly are available in from three- to eight-gang assemblies. (For details circle No. 40 on Reader Service Card.) Micro Div., Minneapolis-Honeywell Regulator Co.

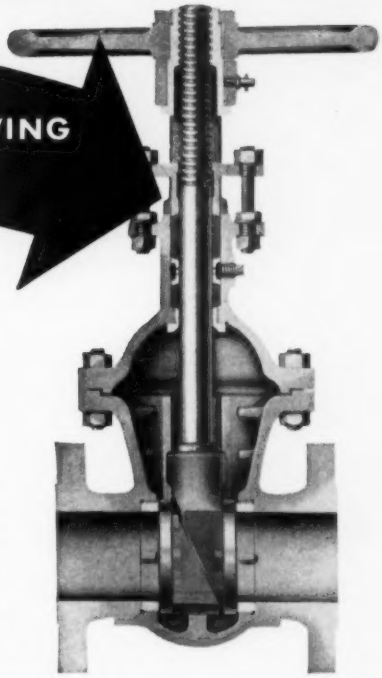
41—RUST REMOVER for use on ferrous metals

Rust-Sol 123 is a phosphoric acid cleaner in concentrate form for ferrous metals, for application either by brush-on or immersion methods. It is rinsed off with clear water. Manufacturer says Rust-Sol dissolves all surface salts, rust and scale from production pieces, neutralizes and activates the surface with a slight etch and iron phosphate coating which makes an excellent base for paint. And because of its neutralizing action, this cleaner can also be used following alkali stripping or cleaning.

Rust-Sol is claimed to be non-toxic non-inflammable and non-volatile; to emit no corrosive fumes, and to be safe for use anywhere in the plant. (Circle

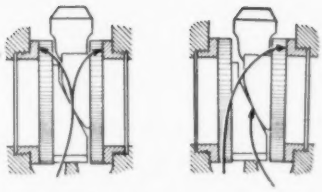
2 WAYS TO GET BETTER VALVE SERVICE!

1 ...UNIQUE DARLING DOUBLE REVOLVING DISC, CAST STEEL GATE VALVE



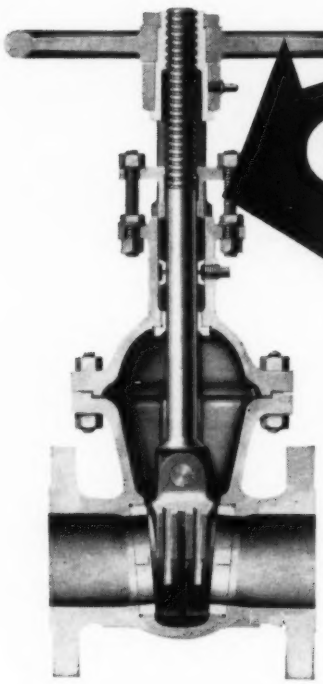
YES, here's a sure way to get better, more dependable valve service. Install this Darling gate valve of the fully revolving double disc, parallel seat type. Time after time users rate it number one for the elimination of down-time and repeated maintenance headaches.

Check the diagrams at right. Note how this Darling gate valve automatically compensates for body distortion, and resulting misalignment of seats. The upper wedge face is radiused, while the lower wedge face is straight, thus disc-to-seat pressure is equalized, assuring tight closure despite distortion and wear.



Discs and seats are parallel. *Seats forced out of parallel by body distortion but discs adapt themselves to give positive closure.* *Radiused face of wedge allows discs to adjust tightly against both seats.*

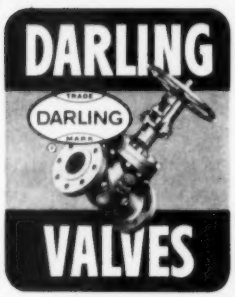
For foolproof simplicity in maintenance and reassembly, and unequalled service life, install this superior Darling Cast Steel Gate Valve.



2 ...DARLING SLOTTED WEDGE CAST STEEL GATE VALVE

HERE'S the second good way to get better valve service. This Darling gate valve's slotted wedge provides *flexibility* when it's needed! It automatically compensates for expansion and contraction due to temperature changes, avoids leaks and minimizes wear and tear on the wedge faces and seats.

What's more, the wedge has *double* guide grooves which engage twin ribs in the valve body. This provides twice the usual bearing area, assuring smooth trouble-free alignment every time!



FOR PLUS VALUES, JOB-PROVED AGAIN AND AGAIN

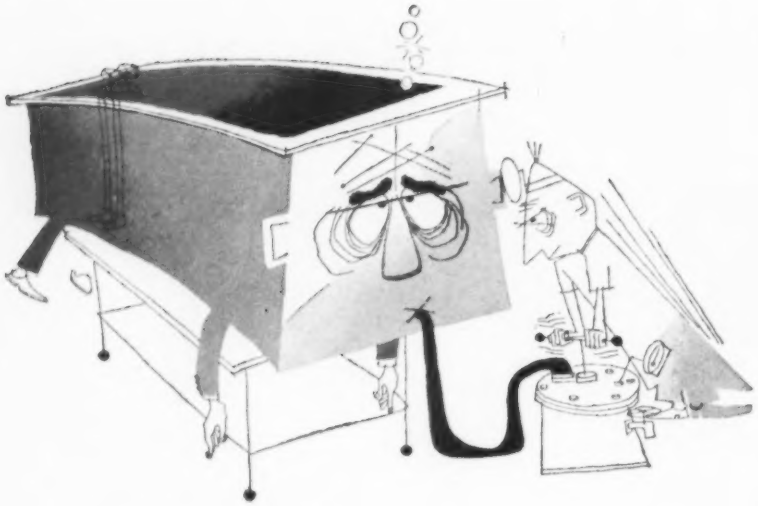
EVERY NEED. *Darling gate valves are made in a wide range of sizes, types and constructions for all kinds of normal and unusual service . . . and for pressures up to 1500 pounds.*

DARLING VALVE & MANUFACTURING CO.

Williamsport 14, Pa.

Manufactured in Canada by Sandilands Valve Manufacturing Co., Ltd., Galt 19, Ontario

For more facts circle 593 on Reply Card



has **coil-itis*** cramped your production flow?

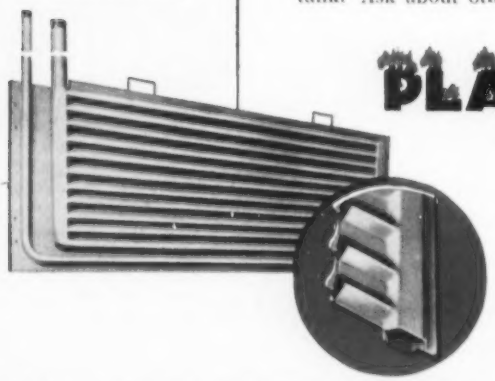
It's a waste of costly time to pump out the solution every time your process heating and cooling tanks get indigestion due to pipe coil troubles. You can save this cost and eliminate production bottlenecks by replacing the pipe coils with Platecoils. Platecoils can be removed and replaced **without dumping the solution**. They simplify maintenance and save hours of downtime. They heat or cool 50% faster and take 50% less space in the tank. As revolutionary as the new wonder drugs, Platecoils cure production troubles involving heat transfer . . . and give profits a shot in the arm.

Write for bulletin P80 today!

PLATECOILS SAVE 50% IN HEAT TRANSFER COSTS

PLATECOILS TRIPLE PRODUCTION

At Continental Motors Corp., 3 crankcase sections can be cleaned at one time when Platecoils are used while only one crank case can be cleaned with pipecoils in the tank. Ask about other case histories.



PLATECOIL

REPLACES PIPE COILS

*Coil-itis — Diagnosed as tank heating and cooling problems. **Platecoils** — the prescription for solving pipe coil problems.

PLATECOIL DIVISION, KOLD-HOLD MANUFACTURING CO., LANSING 4, MICHIGAN

For more facts circle 594 on Reply Card

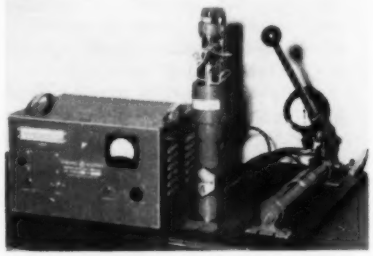
NEW PRODUCTS

(Begins on page 120)

No. 41 on Reader Service Card for information.) Klem Chemicals, Inc.

42—RESISTANCE INDICATOR for better welding bond

Designed to help produce a better resistance welding bond by providing a rapid and accurate measurement of the resistance between pieces of metal to be welded, this new instrument supplies a simple check on pre-welding cleaning processes, upon which surface resistance of the metal depends. It consists of two parts, a microhmmeter and a sample holder, and has two ranges, 0 to 200 and 0 to 2000 microhms. The measured resistance is indicated directly in microhms on a linear 100 division scale. Voltage fluctuations in the supply mains do not affect the reading, company states. (Circle No. 42 on Reader Service Card for further details.) General Electric Co.



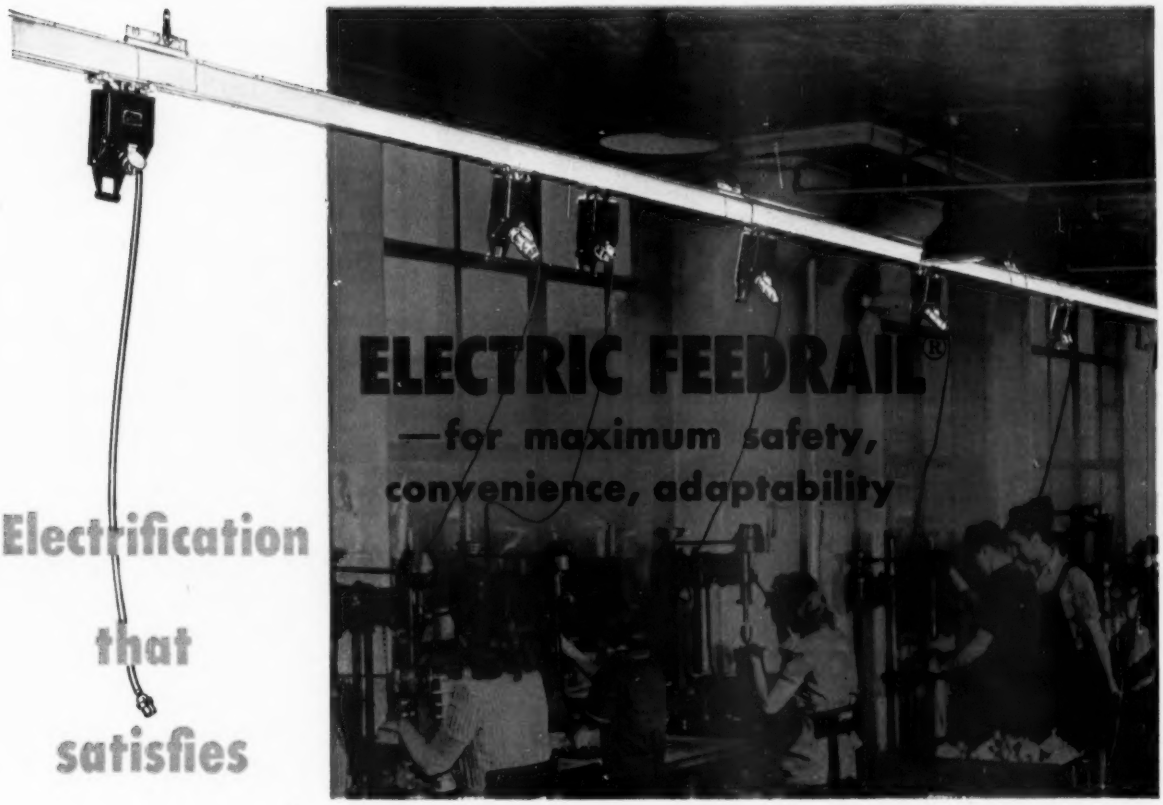
43—CONTROL VALVE is pneumatically controlled unit

The Wee Willie, a high pressure, low flow control valve is pneumatically controlled and specifically adapted to pilot plant operation. Standard models are available with working pressure ranges of 10,000 and 30,000 psi, and special assemblies up to 50,000 psi. Sizes range from ⅛ through ½ in. with screw, welding, superpressure, and autoclave and connections available.

Company's well-known Domotor piston-actuated operator, combined with a multiplying mechanism, develops thrust forces up to 6000 lb to position the valve plug aaginst extreme forces of off-balance and packing friction which develop in the high pressure field, company explains. (For more information on the Wee Willie circle No. 43 on Reader Service Card.) Annin Co.

44—LIQUID BELT LUBE comes in spray-type can

New Spray Type Liquid Belt Lube is packaged in 12-oz pressure cans, so that the lubricant is released in a fine mist by pressing the nozzle. According to manufacturer, this product revitalizes leather, rubber or fabric transmission belts, restoring flexibility, prolonging life and stopping slippage. (Circle No. 44 on Reader Service Card.) Alexander Brothers Belting Co.



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For more facts circle 595 on Reply Card

Engineer answers vital questions about the strongest wire rope made—Flattened Strand

Why does Hercules® Flattened Strand wire rope continue to outperform round strand rope by 2 to 1 or more? Can you use it? Here, Walter C. Richards, chief engineer, A. Leschen & Sons Rope Co., tells you.

More and more wire rope users are continually experiencing or hearing about spectacular performances of Hercules Flattened Strand wire rope. The explanation is clear.

First, Hercules Flattened Strand is a Super-rope because it packs 10% more steel than any round strand rope of the same size. It's 10% stronger...10% safer.

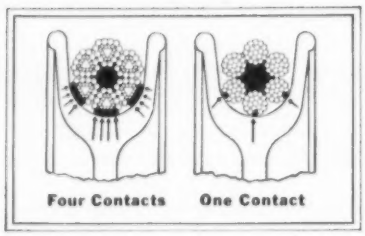
Second, Hercules Flattened Strand wears longer and more evenly. That's because there are four wires per strand contacting sheave grooves instead of one.

Third, Hercules Flattened Strand resists crushing and internal strand-cutting, because strands rest snugly against each other, keystone fashion, with less internal pressure or friction.

Fourth, Hercules Flattened Strand prolongs its own life and the life of equipment, because the relatively smooth surface of the rope prevents corrugating and wear on sheave grooves.

Can you use it?

It's a known, proved fact that no other wire rope made can equal Flattened Strand on applications such as hot ladle cranes, skip hoists, and dredge ropes. It is also best on a variety of other equipment both large and small. For many uses, it is truly a Super-rope.



With Flattened Strand, notice how four wires per strand contact sheave grooves—reducing rope and equipment wear.

But, the question is, can *you* use it to advantage? That can be answered only by a qualified wire rope engineer who is thoroughly acquainted with the characteristics and proper uses of Flattened Strand rope.

Check with the authority

That means, check with Leschen. It's wise to do so because Leschen pioneered and perfected Flattened Strand wire rope. Leschen developed special machines to make it. Leschen conducts continuing research on correct uses. Leschen is the authority.

If you discover you can use this Super-rope—Hercules Flattened Strand—you'll soon begin saving time, labor and money. Why not investigate *now?*

Hercules Flattened Strand wire rope made by
A. LESCHEN & SONS ROPE COMPANY
St. Louis 12, Missouri

In business only to make wire rope . . . better wire rope . . . since 1857

Copyright, A. Leschen & Sons Rope Co., 1953

For more facts circle 596 on Reply Card

"Push Button" Plants Mean New Safety Problems

AUTOMATIC PLANTS, powered by atomic energy and supervised by only a few highly skilled technicians, were pictured by F. W. Braun, safety engineer and vice president in charge of the Accident Prevention Dept. of Employers Mutuals, for future generations. He outlined the forthcoming changes in machines, materials and methods at the "Conference on Future Risks" recently sponsored by Mutual Fire-Casualty Insurance Companies.

Examples of automatic plants already in existence were: the milling machine developed by Massachusetts Institute of Technology and an automatic cylinder block production line at Ford's Cleveland plant.

The MIT milling machine, without help from a human operator, converts information on punched tape into the contours of a finished part. The Ford cylinder block line has a rated output capacity double that of any other in the industry because the automatic line can feed and unload machines twice as fast as manual operation.

Unbelievable developments of the future in atomic energy were unveiled recently at Arco, Idaho. Electricity was generated by atomic power, and at the same time created more atomic fuel than it burned up.

These and other developments will minimize or eliminate entirely some of the material handling hazards of today, but at the same time create new problems and hazards. Among these he listed the special precautions required for storing and handling flammable, toxic or corrosive materials, radioactivity, and the control of noise and vibration.

Exposition of Basic Materials

A WHOLE RANGE of new materials flowing from the laboratories of industry will be discussed at the Exposition of Basic Materials for Industry, which will be held in New York at the Grand Central Palace, from June 15th to 19th.

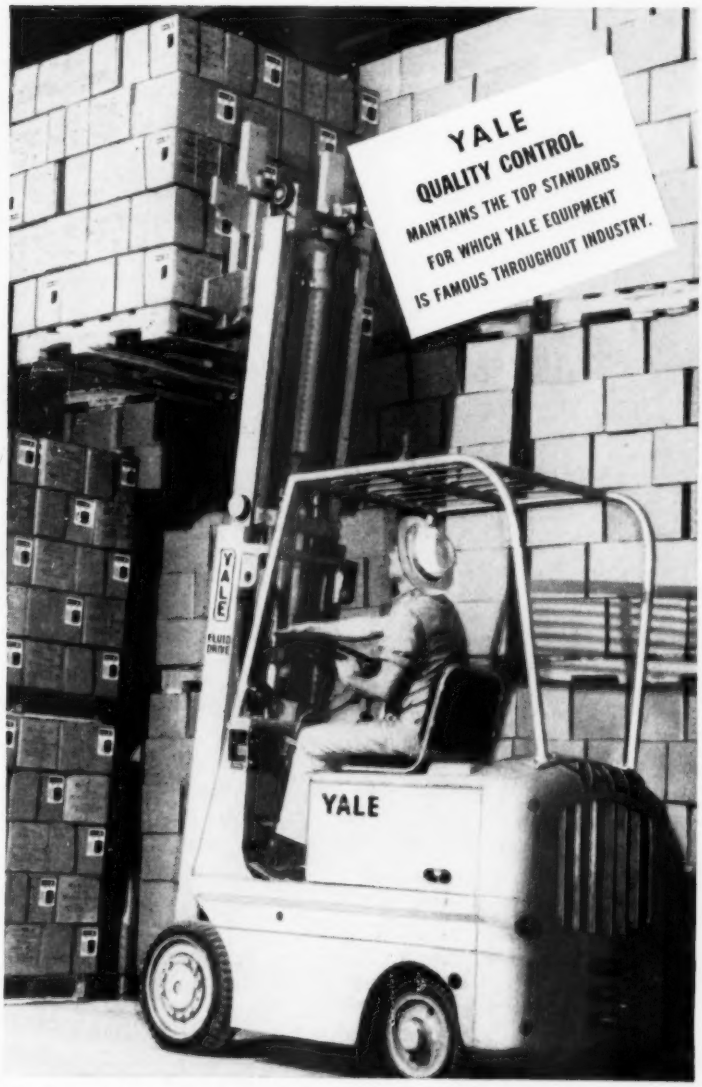
Simultaneously with the exposition, a series of technical conferences will be conducted to discuss the properties and potentialities of the new materials. The event is intended to create a new source of information and ideas for engineers, research scientists and executives by offering an integrated picture of the vast and complicated structure of materials fundamental to product development.

Besides the emphasis on new materials, the exposition will demonstrate new uses for standard products.

Additional information on this Exposition may be obtained by writing to Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y.

Again in '53 YALE sets the pace

Give this great YALE truck every test you know. Run it fully loaded on ramps, indoors and out. See the power it delivers... the fuel economy it gives. Let operators test it for smoothness...for maneuverability... for safety...and you'll see why it's the standout truck of this or any other year.



Features no other truck combines

1. Fluid Drive...gives 3 to 8 times longer clutch life
2. 65 HP industrial engine built for rugged continuous service
3. Automotive Type Brakes with extra braking surface
4. Shockless steering...for greater operating ease and safety
5. Hypoid Gears oil-sealed against dirt and dust, give drive 30% more strength against shock loads

*Registered trade mark

A line that meets every materials handling need

Whatever type of truck will serve you best—Gas, Electric or Diesel powered—you'll find it in YALE's comprehensive line.

Also ask for full information on the numerous attachments Yale makes available for special handling problems.

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Sell the **Plant Engineer...**

and you've sold your product

TODAY'S most important industrial purchaser is the man responsible for the plant engineering function. Many companies use various titles . . . but the function is the same. These key buyers are responsible to management to keep the plant operating at the highest productive capacity . . . at the lowest unit cost. To do this they *must* know a lot about all kinds of products, which can help them carry out their job. *Here are some of their more important interests—*

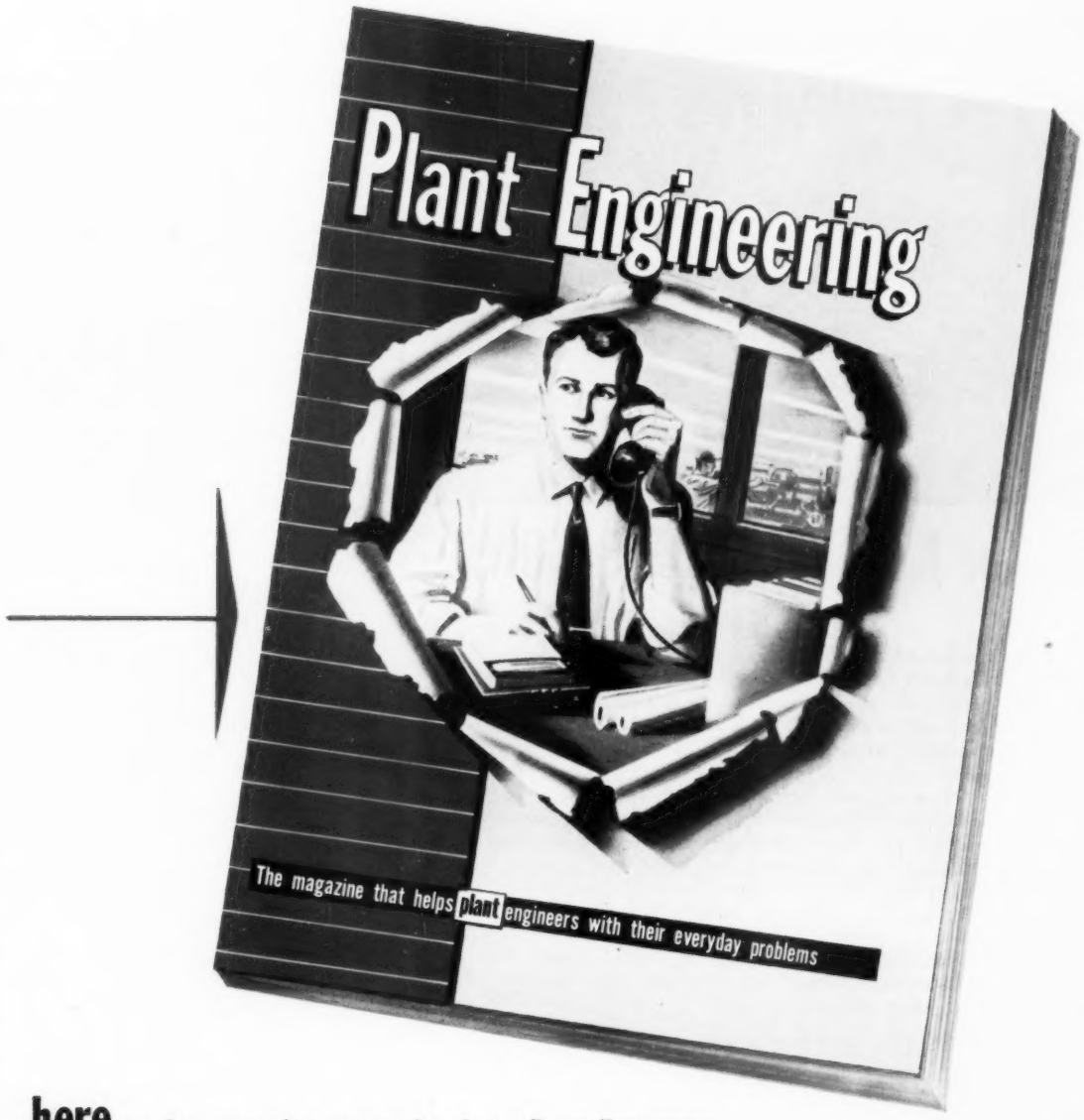
1. **Material Handling**
2. **Production**
3. **Power Utilization**
4. **Power Distribution**
5. **Plant Maintenance**
6. **Heating and Air Conditioning**
7. **Power Supply**
8. **Lighting**

To become an expert on all of these subjects would require constant reading of twenty to thirty trade papers a month, each specializing in one of these subjects. Impossible? . . . of course it's impossible. So how can a plant engineer keep up to date on all these important subjects? The answer is easy . . . in one magazine, written and edited exclusively for the plant engineer . . .

"Plant Engineering"

The magazine that helps **plant** engineers with their everyday problems

The editorial material is carefully developed each month by field checking editors, to present timely information to help the plant engineer with his problems. Each editorial is brief, concise and factual, boiled down for quick, painless reading. *This is the only plant magazine in which all the editorial material is of key interest to all the readers.*



here are five outstanding reasons for placing PLANT ENGINEERING on your advertising schedule—

1. **Reaches 32,100 plant engineering men . . . *more plant engineers than any other industry trade paper.***
2. **Reaches *over 24,000 key plants* in the United States, which are responsible for purchasing 76% of the Country's industrial plant equipment.**
3. **Reaches more plants *with 100 employees or over,* than any other industrial plant operating paper.**
4. **Pin points your sales message to your number one buying influence of plant equipment *at the lowest cost per thousand.***
5. **Guarantees editorial material in every issue of *vital interest to all of its readers.***

These five statements cannot be duplicated by any other industrial plant magazine. Compare PLANT ENGINEERING with any other plant operating industrial magazine on these five points. This is your assurance that when you select PLANT ENGINEERING to advertise your products, you select the number one paper . . . to reach the number one influence in the purchase of industrial plant equipment.

REMEMBER . . . **Sell the plant engineer . . . and you've sold your product.**

For more detailed facts . . . write for PLANT ENGINEERING'S "Comparison Test." Technical Publishing Company, 110 South Dearborn St., Chicago, Ill.

When you have a leather problem...

Consult J. E. RHOADS & SONS

At your service are Rhoads 250 years experience, the knowledge and expert craftsmanship of developing special industrial leathers. Whether your problem involves flat leather belting for the transmission of power . . . leather packings, or any one of a large variety of textile leather straps . . . our engineering department will help you resolve your problem.

Rhoads offers a *complete service* . . . this includes the physical testing and research facilities as well as the cooperative efforts of engineers, production men, and sales representatives. Such coordination of skill and knowledge, when used to survey your requirements and "custom-engineer" the manufacture of the best possible leather for your use, will result in your infinite satisfaction.

Why not put these valuable forces to work for you. To initiate the "custom-engineering" of your individual leathers, call in a Rhoads sales engineer today.

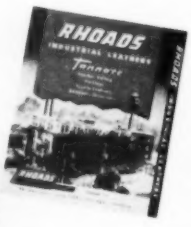
J. E. RHOADS & SONS
35 N. Sixth St., Philadelphia 6, Pa.

RHOADS "CUSTOM-MANUFACTURES":

Tannate® LEATHER BELTING . . . with its high coefficient of friction, is tough, durable and adaptable to a variety of drive conditions.

Tannate® LEATHER PACKINGS . . . available for hydraulic or pneumatic equipment for a wide range of pressures and temperatures.

Tannate® TEXTILE LEATHERS . . . made from hides specially tanned for strapping leather, custom cut to meet your requirements.



RHOADS
INDUSTRIAL LEATHERS

Write for Rhoads easy reference file on industrial leathers. No obligation. Write: J. E. Rhoads & Sons, 35 N. Sixth Street, Philadelphia 6, Pa.

PHILADELPHIA • NEW YORK • CHICAGO • ATLANTA

For more facts circle 598 on Reply Card

INDUSTRIAL FILMS

Dust Control System

A SOUND-COLOR film "The Invisible Shield" shows a complete dust control system in actual operation. The equipment is photographed in one of the country's most modern foundries, and shows the important role that dust and fume collection is playing in today's production of castings.

The film, running time 22 minutes, takes the viewer through each phase of operation, thoroughly explaining the features of the dust control equipment as applied to each work station.

Readers interested in showing this film should contact Sales Department, Claude B. Schneible Co., P. O. Box 81, North End Station, Detroit 2, Michigan.

Film on Welding

THE FILM "Tool of Many Uses" documents more than a dozen actual case histories of production line applications of the Aircomatic welding process. This colored, sound motion picture film, running time 18 minutes, includes aluminum welding operations on materials ranging from ⅛ in. up to one full inch in thickness. It also shows aluminum welds 2 in. long that required only 7 seconds to make, and aluminum build-up work in which 10 lb of metal were deposited in an hour's welding time.

Copper welding shown in the picture includes one of the largest welded copper vessels ever built as a production item; aluminum bronze gear blanks 3 ft in dia for marine use, and other demonstrations of the versatility of this process. Both automatic and manual welding are shown in use on stainless and mild steel for a number of applications.

More information on the availability of this film may be obtained by writing to Air Reduction, News Bureau, 60 East 42nd St., New York 17, N. Y.

How to Control Rust

MANY HELPFUL ideas on how to stop corrosion and cut costs are presented in a new full color sound movie, "The Captain's Idea."

The film moves through interesting scenes showing new ways to stop rust and cut costs in the petroleum field, railroading, farming, coal mining, steel production, cement companies, breweries, trucking companies, marine uses, and many more to provide educational entertainment for nearly every type of group from civic clubs and fraternal organizations to select groups of heavy in-

dustry, or the average homeowner.

For complete information on the availability of the film, write on company letterhead to the Rust-Oleum Corp., 2425 Oakton Street, Evanston, Illinois.

Shell Molding Film

A SHORT, but detailed, sound film on shell molding is now available for use at technical societies and engineering schools.

This 6 minute film is an ideal introduction to a discussion of the shell molding practice. A series of 22 mounted photographs is available for display purposes along with the film. Information on scheduling this film may be obtained from The Public Relations Division, The Cooper Alloy Foundry Co., Hillside 5, New Jersey.

Steam Trapping

A COLOR AND sound motion picture, running time 20 minutes, entitled "Please Pass the Condensate" covers the subject of up-to-date steam trapping for more production.

It portrays the operation, selection, application and maintenance of steam traps—all with the ultimate aim of getting more production from steam heated equipment through reduced heat-up time and hotter operating temperature, as well as shortened down-time for repairs and cleaning.

Information on obtaining prints for showing may be secured by writing to the Yarnall-Waring Co., Philadelphia 18, Pennsylvania.

Waste Disposal

THIS FILM, titled "Air, Water and Industry," discusses waste disposal methods for industry. Running 25 minutes, with sound and color, it tells of the industrial pollution problem and shows what typical industries are doing to abate pollution.

Availability of this film may be determined by writing to the Dow Chemical Co., 1000 Main St., Midland, Mich.

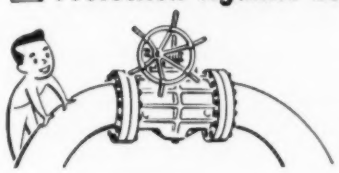
Explaining Electronics

EXPLAINING the 6 basic functions of electronic tubes and the use of each in industrial applications is the theme of the 20 minute, 16mm sound film, "Electronics At Work." Animated drawings are used to show tube construction, and the operation of each component while the tube performs the function for which it was designed.

The film is available on loan from the Westinghouse Electric Corp., 511 Wood St., Pittsburgh, Pa.

The Nordstrom Principle of *Lubrication* gives this 4-WAY PROTECTION

1 *Protection Against Leakage*

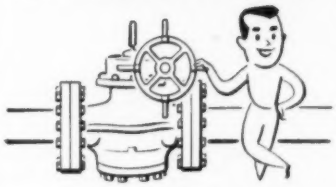


In a Nordstrom valve, lubricant-filled grooves completely surround seat ports providing a positive seal which prevents leakage whether the valve is open or closed.

2 *Protection Against Abrasion*

A film of lubricant protects contact surfaces of a Nordstrom valve from abrasion when it is operated. This wear-resisting feature means Nordstroms operate at a constant high level of efficiency over a much longer period of time.

3 *Protection Against Sticking Tight in Service*



Because the plug rotates within the body on a film of lubricant, a Nordstrom valve operates easily and quickly at any time . . . an important feature in case of emergency.

4 *Protection Against Corrosion*

Corrosive or erosive services cannot wear away the vital seating areas of a Nordstrom valve because, protected by a film of lubricant, *the seat is never exposed to the line fluid.*

Only Nordstrom Lubricant-Sealed valves are protected in these four ways. Bulletin V-217 describes Nordstrom valves for industrial uses. Mail the coupon for your copy.

ROCKWELL Built
NORDSTROM VALVES
Lubricant-Sealed for Positive Shut-Off

Another Rockwell Product

N 5320

Rockwell Manufacturing Company
400 N. Lexington Avenue
Pittsburgh 8, Pa.

Please send me a copy of Bulletin V-217 describing Nordstrom valves for industrial services.

Name_____
Company_____
Address_____ (Street)
(City)_____ (Zone)_____ (State)

For more facts circle 599 on Reply Card

"Buffalo" Tips on AIR CLEANING

Advantages of Removing Fumes, Dust, Gases, Odors by WET SCRUBBING

1. DOUBLE ACTION EFFICIENCY — The action of spray particles combined with scrubbing against a wetted surface results in the highest cleaning efficiency.

2. EASY MAINTENANCE—Constant scrubbing against a wetted surface keeps it clean.

3. FIRE AND EXPLOSION PREVENTION —An obvious advantage of wet air cleaning equipment over dry.

4. CONVENIENT DISPOSAL—Wetted material easier to collect and handle.

5. LOW RESISTANCE to passage of air through most wet type units, requiring less air moving power.

Extremely effective in removing fine dusts and fumes, the "Buffalo" Hydraulic Scrubbing Tower has tangential inlet and high pressure spray nozzles which causes gas to actually aspirate through tower. Water-to-air ratio is very low. No moving parts, no baffles or crevices—thus, continuous operation is possible.

"Buffalo" Hydro-Volute Washer has a triple cleaning action: First, its slotted fan scroll acts as a pre-cleaner, then, spray action and scrubbing action complete the cleaning. Water economy is high because water may be recirculated at low pressure.

"Buffalo" Air Washers were pioneer air cleaning equipment in industry. At left is a Static Washer with hopper for easy sludge disposal. Other types include Wet Glass Cell Air Washers and rubber-lined fume washers.

WRITE FOR BULLETIN 3181-B for the unit to handle your air cleaning problem —"Buffalo" builds 8 types.

"Buffalo" FIRST FOR FANS

BUFFALO FORGE COMPANY

166 MORTIMER ST. BUFFALO, NEW YORK

PUBLISHERS OF "FAN ENGINEERING" HANDBOOK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

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DIAMOND JUBILEE 75 YR ANNIVERSARY

FORCED DRAFT PRESSURE BLOWING HEATING COOLING
VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING

For more facts circle 600 on Reply Card

Pipe Threading Tools

(Continued from page 108)

on the inside of the pipe by the pipe cutter, to insure full inside diameter. Any burr on the outside of the pipe end should be removed with a file, so that the dies will start easily.

Try the fitting or valve to be used on a piece of pipe threaded standard depth, to determine whether the pipe thread to be cut should be standard, oversize or undersize, and set the threading dies accordingly (if an adjustable type).

Unless the pipe is small, do not apply threading oil until after the dies take hold, then apply oil frequently enough to prevent overheating of the dies and insure continuous lubrication. Use only a good grade of oil, since cheap oil will prove very costly in die wear, defective threads and leaky joints.

If the dies fail to take hold, chalk the end of the pipe. After threading begins, pull the stock handles in a straight plane, otherwise twisting of the dies may damage both the pipe threads and the dies.

Remove any sticking chips with a stiff brush or pointed stick, to prevent thread tearing, but, if possible, avoid backing the dies until the thread is completed, and then only with care.

A completed thread is indicated on full width dies by the pipe coming flush with the outside face of the dies. Receding dies, however, stop cutting when proper thread length is reached.

If the dies cut a double or fine thread it indicates that the dies are not in proper sequence in the stock. Torn threads may be caused by chipping or welding of the die teeth. These defects may be due to lack of lubrication, poor threading oil, or dull dies.

Dies may be resharpened by carefully regrinding the lip across the full face of the die, removing the least possible amount of metal, and maintaining the original lip contour. Grind each die in the sequence it occupies in the stock, and avoid overheating and drawing of the temper.

If the thread cut lacks proper taper, check for clogged or worn die slots or loose top collar. If the threaded barrel or leader nut of a stock jams due to fine cuttings, wash it in solvent and re-oil the threads.

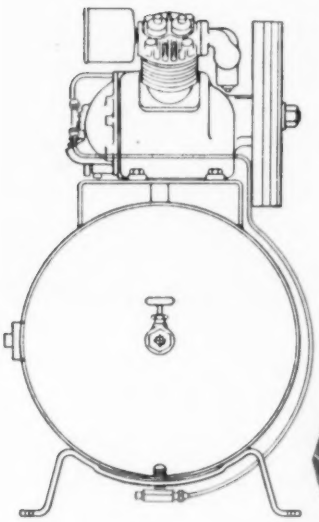
In using pipe taps, clamp them rigidly in a suitable holder, if possible, and start them carefully and straight. Apply even pressure and avoid twisting out of alignment. If the tap jams, back it from the hole and remove accumulated chips from both the tap and the hole. Apply threading oil, except when threading cast iron or brass. It is preferable to ream holes to correct size and taper with a tapered pipe reamer before threading. The same precautions apply to reamers.

KEEP WATER OUT OF YOUR AIR TANK WITH THIS NEW WESTINGHOUSE

C-1 Automatic Drain Valve

COMPLETELY AUTOMATIC

LOW IN COST • EASY TO INSTALL



Made of non-corrosive aluminum and oil-resistant rubber, the Westinghouse C-1 Automatic Drain Valve is installed on the bottom of the tank or aftercooler.

Operating pressure for the C-1 Automatic Drain Valve is obtained from the oil unloader pipe on a "start-stop" unit or the unloader pipe from the pilot valve on a "load-unload" operating unit.

• Let the new Westinghouse C-1 Automatic Drain Valve take over the job of keeping water out of your air tank. It's completely automatic in operation . . . there's no day to day manual draining, or, worse, no forgetting to drain. It eliminates the need for drip pans, drain lines or sewage connections.

Every time your air compressor starts, stops or unloads, the C-1 Automatic Drain Valve goes into action. Its piston—the only moving part—moves between the extended and retracted position, expelling collected water into the air as vapor.

Air pressure from the unloader pipe of your air compressor operates this Drain Valve which may be installed on the tank or aftercooler.

Everything you need for quick, easy installation —including all fittings and tubing—is furnished in a complete kit. The C-1 Automatic Drain Valve is available for all models of Westinghouse Air Compressors and fits most units of other makes as well (lever type unloaders excepted).

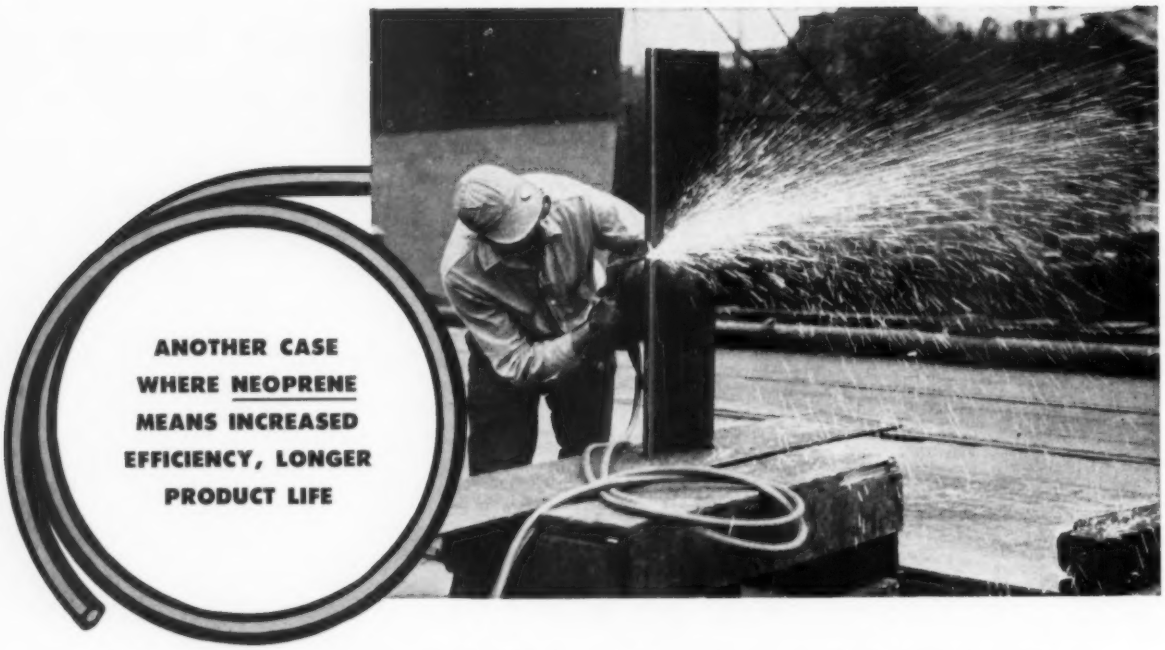
A water-free air supply is a must on most types of pneumatic equipment; it will help you get longer, trouble-free service from every type. Get full information on the Westinghouse C-1 Automatic Drain Valve from your Westinghouse Air Compressor dealer.

Westinghouse Air Brake COMPANY

INDUSTRIAL PRODUCTS DIVISION **WILMERDING, PENNA.**

Factory Branch: EMERYVILLE, CALIF. Distributors throughout the United States . . . Consult your Classified Directory.
Distributed in Canada by: Canadian Westinghouse Co. Ltd., Hamilton, Ontario.

For more facts circle 601 on Reply Card



Neoprene welding hose withstands rough use . . . assures smooth fuel flow

The hose lines which carry oxygen and acetylene to a cutting or welding torch get plenty of rough treatment during their lifetime. But hose made with *neoprene* tube and cover can take this daily punishment and still deliver a steady, dependable supply of fuel to the torch.

Maintenance men know that welding hose made with neoprene is top-quality hose . . . means fewer hose replacements. The durable neoprene cover resists cutting and abrasion from rough surfaces . . . withstands deterioration from ever-present grease and oil and from weathering. Inside the hose, the smooth neoprene tube gives the same kind of dependable service . . . won't crack and crumble into loose particles that clog the torch.

Welding hose is only one of the many high-quality products that benefit from Du Pont neoprene's superior qualities. While Du Pont makes no finished products of neoprene, your manufacturer or distributor will gladly tell you about the neoprene products he supplies.

SEND FOR "THE NEOPRENE NOTEBOOK"
Each issue describes new, unusual applications of neoprene that will be of interest to you. E. I. du Pont de Nemours & Co. (Inc.), Rubber Chemicals Division F-2, Wilmington 98, Del.

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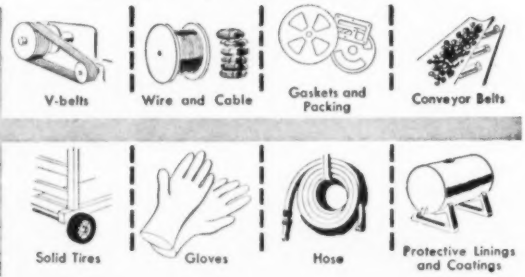
BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

NEOPRENE

The Rubber Made by Du Pont Since 1932

Specify* Neoprene *in these products:



For more facts circle 602 on Reply Card

NEW BOOKS

for the plant engineer

Combustion Technology

FUELS AND COMBUSTION, by Marion L. Smith and Karl W. Stinson. Size 6 by 9 in.; 340 pp; illustrated; cloth bound. Published by McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N. Y. Price $6.50.

THIS BOOK presents to undergraduate engineering students and engineers fundamental and factual information concerning solid, liquid, and gaseous fuels and the problems associated with their combustion.

The eight main sections of the book are: Fuels, stoichiometric analysis, thermochemical analysis, the process of combustion, physical properties of fuels, gas and oil burners, coal burning equipment, and combustion in engines. A list of questions is included at the end of each section.

Since many aspects of this subject have been studied intensively for a number of years, the authors have made liberal use of and reference to the widely diversified literature in the field in their effort to present a modern, concise, and yet fairly comprehensive treatment of fuels and combustion.

Refrigeration

REFRIGERATING DATA BOOK. Size 6¼ by 9 in.; 575 pp approx.; illustrated; cloth bound; 1952 edition. Published by The American Society of Refrigerating Engineers, 40 West 40th St., New York 18, N. Y. Price $7.50.

THIS IS an applications edition covering a variety of uses of refrigerating equipment. Food processing, handling and storing are given considerable attention.

There are sections on low temperature and industrial applications. Attention is also given to industrial as well as comfort air conditioning.

The book includes an extensive classified section which offers the names and addresses of manufacturers and their products.

Utilization of Engineers

HOW TO IMPROVE the Utilization of Engineering Manpower. Size 6 by 9 in.; 52 pp; paper bound. Published by The National Society of Professional Engineers, 1121 Fifteenth St. NW, Washington 5, D. C. Price to non-members $2.00; to members $1.00.

THIS IS the second in a series of reports on surveys made by the Professional Engineers Conference Board for Industry. This summary

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POWRWORKERS
"Job Engineered" to do a hundred and one jobs
POUND FOR POUND, dollar for dollar, you can't beat the value in CLARK'S POWRWORKER Line. You get big-truck benefits at rock-bottom, small-truck cost. Take the POWRWORKER stacker, for example: a rugged, modern fork truck, but cut to fit the tighter handling pattern of narrow aisles, low-load floors, limited budgets. Short turning radius, easy finger-tip control and ample power-plant assure fast, safe handling and stacking. Truly big-truck performance in an economical package.
Ask your CLARK dealer about the POWRWORKER models: stacker, pallet truck, platform truck and tug tractor—"walk 'em or ride 'em." These power-packed time-savers are job-engineered to cut your handling costs in a hundred and one ways. They're built right and priced right to give you top-dollar value.
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THE SIGN OF THE BEST BUY LINE
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Tug Tractor
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Controlled Avalanche Hits This Conveyor Belt!!

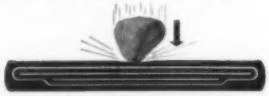
Falling rocks land softly, move surely on Impact-Cushioning REPUBLIC SHOCK ABSORBER BELT

Ten-inch rock dropping from a height of two feet makes quite an impression on a conveyor belt. Multiply this impact many thousand times and you have a rough idea of what happens at National Lime & Stone Company's Carey, Ohio, Plant, where Republic Shock Absorber Belting continuously handles tons of sharp-edged limestone. The loads are catapulted at right angles from one conveyor to the next. But the jagged stones are robbed of their destructive force by a subsurface cushion of resilient rubber compounds that defy puncture, cutting and abrasion. Inner belt structures are further protected by impact-deadening rubber, cut-resisting rubber covers, mildew-proofed carcass fabrics and skims of resilient rubber that give individual plies plenty of "flex room." On this particular installation, Republic Shock Absorber **trebled** conveyor belt life over previous belts used. On other jobs, Shock Absorber has produced even better results. Shock Absorber is a patented Republic product . . . one you should know about! Write today for full facts.

HERE'S WHY SHOCK ABSORBER OUTLASTS ORDINARY BELTS 3 TO 1

ORDINARY BELTING

Impact jars entire structure. Strain on carcass fabrics causes premature belt failure.



SHOCK ABSORBER BELTING

Thick subsurface cushion absorbs impact, safeguards carcass. RESULT—more service, fewer breakdowns!!!

Your local Republic Distributor can help you save money and time on all problems concerning Industrial Rubber Products. Write us now for his name and address.

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REPUBLIC RUBBER DIVISION

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INDUSTRIAL RUBBER PRODUCTS

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reflects the experience in the use of engineers by some 500 companies.

Indoctrination of engineers, the use of supporting personnel to aid the engineer, sources of engineering talent, engineering turnover with its causes and results are some of the subjects discussed in the booklet. Also included is a list of reading material for further information on engineers and their utilization.

Designing Work Forms

DESIGN AND CONTROL OF BUSINESS FORMS by Frank M. Knox. Size 8½ by 11½ in.; 219 pp; illustrated; cloth bound. Published by McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N. Y. Price $6.50.

THIS BOOK explains how to design business forms to gain maximum clerical efficiency in their filling-out and subsequent use.

There are many before and after examples of improved forms, also a description of an index developed by the author for analyzing and classifying forms for permanent and effective control.

Several of the chapters, which will be of interest to many readers, are: Organizational control over office forms; Designing the form; and Specification writing.

Industrial Films

INDUSTRIAL FILM BIBLIOGRAPHY. Third edition; size 8½ by 11; 100 pp; stiff paper binding. Prepared by National Metal Trades Association, 122 South Michigan Ave., Chicago 3, Illinois. Price $2.00.

THIS FILM bibliography lists, classifies, and describes films on 1,390 different subjects. The films are indexed by both subject matter and title. Each listing shows size of film, running time, cost, source, and has a paragraph of descriptive matter.

A quick rundown of the table of contents will give an idea of the many fields covered: Aerodynamics and aircraft, bearings, cutting and cutting tools, dies and diemaking, electricity and electronics, engines, first aid, heat treating, lathes, machine shop, maintenance, materials handling, metals and metallurgy, patternmaking, physics, pipefitting, thread cutting, and many others.

Report on Paints and Painting

PAINTS—Their Selection and Use for Interior Surfaces. Size 8½ by 11 in.; 30 pp; paper bound. Published by American Hotel Association, 221 West 57th St., New York 19, N. Y. Price $1.00 to non-members, free to members.

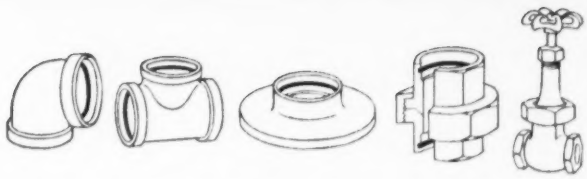
THIS GUIDE on paint and painting has been prepared for the American Hotel Association by the York Re-

WALSEAL®

COMPLETE LINES OF WALSEAL VALVES AND FITTINGS

WALSEAL is a smooth-bore, bronze valve or pipe fitting having a **factory-inserted** ring of silver brazing alloy in the outlet or outlets. The brazed joint that results when a Walseal product is installed is leakproof, vibration-proof, and corrosion resistant. The alloy fillet that appears upon completion of the joint is visual assurance of **full penetration of alloy.** This improved method of joining brass, copper, or copper-nickel pipe or tube is another Walworth contribution to the progress of the valve and fittings industries.

In addition to its complete line of Walseal products, the Walworth Company manufactures complete lines of valves, fittings, unions, and flanges in a wide range of sizes and temperature-pressure ratings. The company also makes three lines of pipe wrenches, the Genuine Stillson, Walco, and Parmelee. Walworth products total approximately 50,000 items and are sold through distributors or agents in all parts of the world.



The sectioned Walseal tee illustrated, shows: (a) the fillet of alloy that appears upon completion of the Walseal joint. This fillet is your visual assurance of complete penetration. (b) the factory-inserted ring of silver brazing alloy. (c) sectioned view of the completed Walseal joint showing penetration of alloy both ways from the insert. Walseal joints can be made only with Walseal valves or fittings. For further details regarding Walseal products, ask for Circular 84.

WALWORTH

Manufacturers since 1842

valves . . . fittings . . . pipe wrenches

60 East 42nd Street, New York 17, N. Y.

SEE OUR CATALOG IN SWEET'S

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

search Corporation of Stamford, Conn. It is presented in two parts. The first deals with theory and practice and the second is devoted to tests that were made on a number of acceptable paints produced by various companies.

Some of the subjects covered in the first section are: constitution of paint; methods of application; preparation of surfaces, common paint failures and paint economics.

The second portion explains the terms used to identify the characteristics of the different paints. Hiding power, brushing and levelling properties, skinning, and washability are some of the factors considered in rating the different products. Five charts, each reporting on different types of paint, present the results of comparative tests.

Tips on Material Handling

MATERIAL HANDLING. Booklet No. 2 of the Library of Know-How. Size 8½ by 11 in.; 12 pp; paper bound. Published by The Material Handling Institute, Inc., 811 Clark Bldg., Pittsburgh 22, Pa. Price 50 cents.

THE 35 RULES on material handling that are offered in this booklet are a condensation of 85 rules originally written by several people over a period of years. These are arranged in five groups: methods; plant layout; equipment; working conditions; and training of personnel.

An analysis of material handling problems is presented in the form of a series of questions entailing the functions of receiving, production and shipping. A flow chart, based on the handling of refractory stove tile is included. The booklet also contains material on the development of cost data.

Note: PLANT ENGINEERING has a limited number of copies of this booklet available for free distribution to interested readers. If you would like a copy, simply write "Material Handling Booklet" on one of the post cards appearing in this issue.

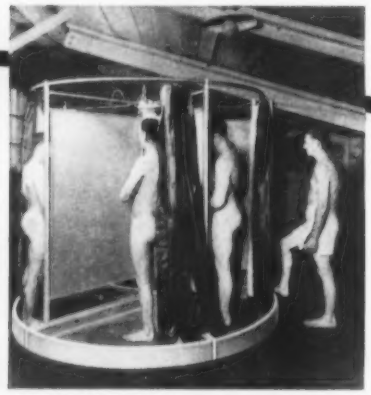
Basic Electrical Engineering

FUNDAMENTALS OF ELECTRIC ENGINEERING by Fred Pumphrey. Size 6 by 9 in.; 668 pp; illustrated; cloth bound. Published by Prentice-Hall, Inc., 70 Fifth Ave., New York 11, N. Y. Price $7.65.

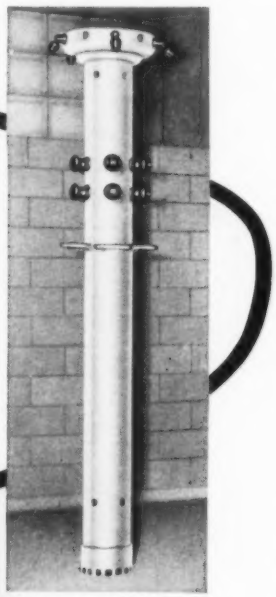
THIS CLEAR and concise presentation on the fundamentals of electrical engineering by Professor Pumphrey of the University of Florida is primarily designed for students specializing in other fields of engineering, so that they can gain the invaluable basis of a knowledge of the electrical field. It is also intended as a text for reference during the early professional life of the student, and will serve the needs of engineers who often seek electrical information.

It is recognized that the field of electrical engineering is usually limited to the application, selection, operation and maintenance of various types of electrical equipment. Only such simple design computations are included as needed to demonstrate the fundamental physical relationships. Because of the growing importance of electronics, considerable attention is given to this branch of the electrical art. In addition to an explanation of the physical phenomena, sufficient quantitative material is provided so that simple amplifiers and electronic switches can be designed.

This book is one of the Prentice-Hall Electrical Engineering Series, and should be a useful refresher.



3- and 5-Stall Shower Units are delivered partially assembled.



This is same shower without stall partitions.

INDUSTRY INCREASES USE OF BRADLEY MULTI-STALL SHOWERS

Bradley Showers well meet all the requirements for quick, healthful, convenient showering. They are made in 3-stall and 5-stall units which are shipped partially assembled for fast installation, and they reduce piping and piping connections one-third to one-fifth because one hot water, one cold water and one drain serve 3 to 5 stalls.

Arrangement suggestions are included in new 12-Page Booklet, "Washroom Layouts." Copy free on request. BRADLEY WASHFOUNTAIN CO., 2273 W. Michigan Street, Milwaukee 1, Wisconsin.

AMONG RECENT INSTALLATIONS—

Detroit Steel · Inland Steel · John A. Roebling · H. A. Wilson Co.
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BRADLEY multi-stall showers

Distributed through Plumbing Wholesalers

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Readers wishing tear sheets of any article appearing in the issue for their personal file may obtain them by indicating the item desired on one of the post cards appearing in this issue. Offer good for 3 mos. after date of issue.

NOW... G-E Super Coronol* rated at 85 C copper temperature

NEW HIGHER RATING APPLIES TO ALL SIZES FOR 0- TO 8000-VOLT SERVICE

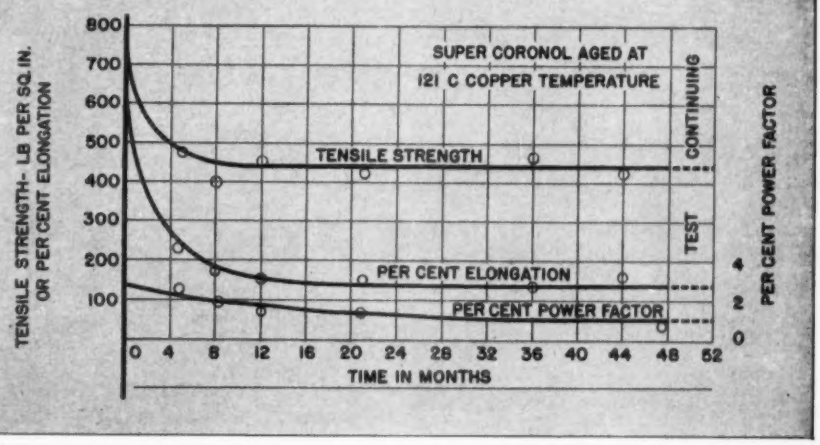
General Electric announces that effective immediately it is basing the ratings of all Super Coronol power cables for service up to and including 8000 volts on a permissible maximum copper temperature of 85 C. To our knowledge this is the highest rating ever announced for a solid dielectric power cable in this voltage range. For voltages above 8000, ratings continue to be based on 80 C.

The new temperature ratings mean that Super Coronol cables are now capable of carrying up to 12 per cent more power, continuously, than old-style ozone-resisting rubber-type compounds rated 75 C maximum.

This higher rating is a conservative increase, based on life tests of many cables taken from regular production. Most severe, and at the same time, most impressive of these tests involves cable held continuously under load at a copper temperature of 121 C. This test is now nearing the end of its 5th year. Both physical and electrical properties have been stable since the 20th month. In view of such results, the new rating is still extremely conservative—*and can safely be applied to all Super Coronol cable now in service at potentials up to 8000 volts.*

G-E cable specialists in your area will be glad to help you calculate just what this new rating means in current-carrying capacity in any specific installation—both for continuous loading and for emergency overloads. Or you may wish to write Section W45-264, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

This curve shows the results of aging tests on Super Coronol cable to date. The tests are being continued. Note that these results were obtained at a copper temperature of 121 C. Following the rule that insulation life is doubled for every 8-10 C decrease in temperature, the ample factor of safety in the new ratings is obvious.



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Single conductor-Geoprene jacket

Single conductor shielded Geoprene

Pre-assembled aerial cable

Mine Power Cable

Two-conductor concentric lighting cable

You can put your confidence in

GENERAL ELECTRIC

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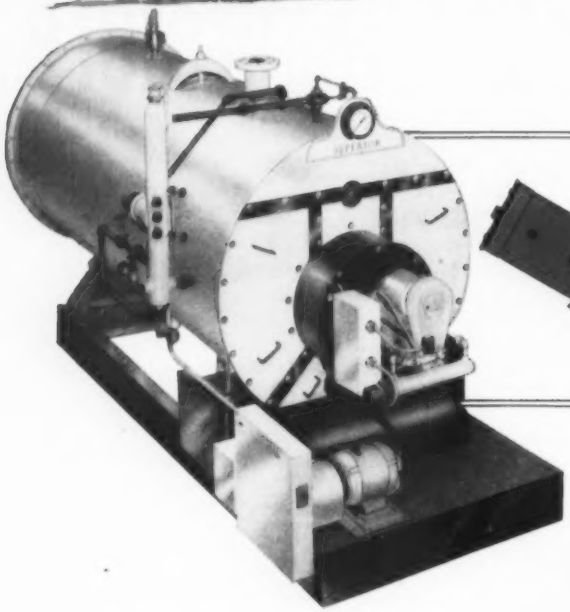
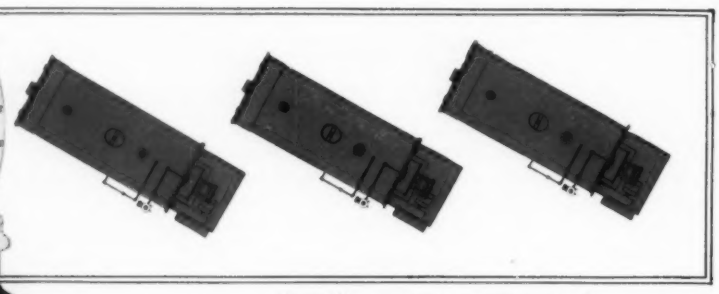
this is the plant . . .





Unusually compact arrangement allowed for the installation of all three units in a boiler room only 20' x 60'

. . . . where 3 **SUPERIOR** *STEAM GENERATORS*

saved more than their cost in less than 2 years

Only four years ago, this plant was inadequately heated with coal at a fuel cost (excluding labor) of approximately $44,000. per year. Three years ago, three Superior Steam Generators were installed with the following three results:

(1) Fuel costs were cut to $22,000 . . . and in less than two years, those Superior Steam Generators saved their total cost.

(2) The ability of those Superior Steam Generators to deliver their full rated capacities provided steam in excess of that required for heating . . . which was sold as process steam to further reduce the cost of operation.

(3) Because of their compact design, a substantial saving in space resulted; and the space thus saved was profitably rented to still further reduce the cost of operation.

To meet increased demands for process steam, a fourth Superior Steam Generator has recently been installed.

This is but one of the many case studies which demonstrate the advisability of investigating the installation of Superior Steam Generators in your plant. For complete details write for Catalog 505.

Superior Steam Generators are fully automatic; burn oil, gas, or both. 18 sizes from 20 to 600 b.h.p. for pressures up to 250 p.s.i. or for hot water.

for performance you can **BANK** *on*

SUPERIOR COMBUSTION INDUSTRIES INC.
TIMES TOWER, TIMES SQUARE, NEW YORK 36, N.Y.

SUPERIOR *STEAM GENERATORS*

For more facts circle 608 on Reply Card

(Continued from page 38)

and includes sectional and exterior views of the various types of units, together with selection tables and pertinent data. Presents many standard types of centrifugal pumps, sump pumps, sewage pumps, vertical turbine pumps, condensation return units, rotary pumps, horizontal and vertical piston pumps, deep well reciprocating pumps, accessories. The Deming Co.

134 Pump Service Manual—Bulletin 202 is a 28-pp booklet covering installation, operation and maintenance of manufacturer's reciprocating pumps and providing helpful engineering information. Suction piping, valves and accessories for proper operation are discussed. Sectional drawings and parts lists are provided, also high and low capacity steam consumption curves, general information on water, properties of saturated and superheated steam. Warren Steam Pump Co., Inc.

135 How to Solve Pumping Problems—A new printing of this popular 36-pp booklet makes it again available to plant engineers. Filled with helpful technical information, explains design and operation of rotary gear pumps and discusses factors of pumping problems, covering some sample ones in detail. Illustrated, provides friction loss and conversion tables, electrical data, viscosities of liquids, construction materials for handling various liquids, resistance of valves and fittings to flow of fluids. Geo. D. Roper Corp.

136 Close-Coupled Pump—Construction features of company's supporting-adapter type, close-coupled general purpose pump in capacities to 2500 gpm at heads to 550 ft are described and shown in Bulletin 52B6083A. Alternate sealing arrangements available are diagrammed, and dimensions given. Allis-Chalmers Mfg. Co.

137 Improved Compressor — How this manufacturer's Spiraxial compressor for air or gas is designed to provide peak efficiencies with minimum servicing is explained in Bulletin SC-152. Construction and design details are discussed in detail. Roots-Connersville Blower.

ELECTRICAL

138 Control Centers—This 31-pp application booklet (B-5621) on control centers stresses the case for centralizing all controls of an entire system in one group of enclosures. Discusses the characteristics of control centers that make for flexibility of use, ease of servicing, safety. Three types are described, and the various electrical components that make up typical units are illustrated. A three-step building-block system of planning control center is given, along with check charts on arrangement. Westinghouse Electric Corp.

139 What's Said About Silicone Insulation—Eight-pp Form 10-100 is a booklet of condensed reports on operating conditions and performance of equipment insulated with Silicone (Class H) electrical insulation. These are case histories in which such equipment was specified for use where overloads had caused frequent failure, where high ambient temperatures limited motor life, where rapidly reversing motor service caused premature failure, where motors failed because of excessive moisture, etc. Dow Corning Co.

140 Putty Insulation Compound—Form E-SF describes and pictures the use of a new electrical insulation putty which comes in a roll and applies like tape but soon fuses into a homogenous mass. Discusses cleanliness, ease of application, easy cable splice build-up and other advantages. Minnesota Mining & Mfg. Co.

141 Power Conversion Units—Illustrated Bulletin GEA-3658A, 8 pp, contains design features, performance, circuits, applications and advantages of a line of metallic rectifier power conversion units. A chart of dimensions, ratings and weights is included. General Electric Co.

142 Timing Relays—This 16-pp bulletin featuring a line of timing relays describes fluid dashpot, pneumatic and electronic timers. Also contains complete operation and engineering data. Applications are stated and timers are shown in a variety of standard enclosures. Allen-Bradley Co.

143 Totally-Enclosed Motors — Eight-pp Form 1784, illustrated in full color, presents a line of totally enclosed motors, including types for both hazardous and non-hazardous locations. Design details of the motors are shown in a large cutaway drawing, and special construction features are pictured. U. S. Electrical Motors, Inc.

144 Flexible Cords—This well-illustrated 24-pp booklet includes all new Underwriters' classifications for flexible cords manufactured by this company. Featuring data on Dynaprene and rubber jacketed cords as well as braid covered types, also gives information on cord selection, how to order specialties. Whitney Blake Co.

145 Current Transformer Application Guide—Twelve-pp Bulletin GEA-6574, on company's indoor-outdoor butyl-molded current transformers, contains descriptions of typical indoor and outdoor uses of current transformers with ratings 200 to 800 amp. Also includes typical wiring diagrams. General Electric Co.

146 Retractile Cords—This 8-pp bulletin presents retractile cords for general communication and power applications. Containing catalog data and ordering information as well as application photos, explains how the cords are made, where they are used, advantages. Koiled Kords, Inc.

LUBRICANTS

147 Molybdenum Disulfied Lubricants—Bulletin 95, 8 pp, gives technical information on standard industrial grades and compositions of Molykote lubricants, including prices and packaging data. Features a detailed description of this new principle in lubrication and applications of the compound. Describes a dry powder lubricant; a grease consistency mixture; a bonded coating; a colloidal dispersion; and a liquid dispersion. The Alpha Corp.

148 High Pressure Lubricant—Sunep, an extreme-pressure lubricant for high-output industrial gearing, is described in this 12-pp pocket-size booklet. Outlines lubricating problems faced by industrial plants in stepping up production with existing equipment and tells how Sunep helps to solve them. Sun Oil Co.

MECHANICAL POWER TRANSMISSION

149 Speed Reducers — Shaft-mounted speed-reduction units are illustrated and described in this 20-pp catalog. Gives complete information on dimensions of

February, 1953

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PLANT ENGINEERING

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units, where and how they're used and how they're installed. Includes instructions on how to select proper size drive. The American Pulley Co.

150 Sprockets in Stock—This 12-pp catalog on Grip-Master sprockets lists seven main advantages of company's sprocket system, including factory-bored tapered split bushings and hubs, positive shaft fits, "off the shelf" service, packaged units. Includes sizes, prices. Cullman Wheel Co.

VALVES, PIPING AND ACCESSORIES

151 Relief Valves, Other Equipment—Bulletin C-49 is an 8-pp condensed catalog covering company's boiler water feeders, low water fuel cut-offs, pump controls and relief valves—including the new temperature relief valves and combination temperature-pressure relief valves. Information is arranged to simplify selection of equipment. McDonnell & Miller, Inc.

152 Head Loss Data on Plastic Pipe—Authoritative data has been compiled on head loss due to friction in plastic pipe and is available to plant engineers in the form of charts and graphs. They are based on a combination of this manufacturer's own experience and a compilation of data derived from a check of flow properties by hydraulic laboratories. Carlon Products Corp.

153 Insulated Pipe—This illustrated bulletin discusses construction and applications of company's Pre-sealed insulated pipe, described as an insulated conduit which does not depend on a metal jacket for protection from moisture, leakage and corrosion. Explains field joint procedure, also covers anchors and end caps for use with the pipe. Durant Insulated Pipe Co.

154 Plastic Pipe—Here's a 16-pp brochure containing information on four types of plastic pipe: flexible, semi-rigid, rigid high impact, and rigid polyvinyl chloride pipe. Detailed tables give chemical and physical characteristics of each type. Also included are advantages of using plastic pipe and directions on how to install and join it. Plastic Products Div., Triangle Conduit and Cable Co., Inc.

155 Corrosion-Resistant Gasketing—Complete information on the basic compositions and physical characteristics of Tygon gasketing is given in Bulletin G-320. Tells where and how it is applied and provides a frank discussion on the advantages and disadvantages of Tygon compounds. Charts show company's complete line. The U. S. Stoneware Co.

BOILERS AND AUXILIARIES

156 Boiler-Burner Units—Fourteen-pp Form 2214 is a catalog providing full descriptive information and other data on the entire line of Kewanee-Iron Fireman boiler-burner units. Arranged for easy selection of the proper unit for any particular application to high low pressure heating, power or process steam production. Kewanee-Ross Corp.

157 Oil and Gas Burners—Eight-pp Bulletin P-152 illustrates and describes manufacturer's Pac-O-Matic oil, gas and combination burners for industrial process and institutional applications. Tells advantages of the packaged unit. Coen Co.

158 Dual-Stage Oil Burners—Bulletin 25 describes oil burners designed to offer advantages of both steam and mechanical atomization. Explains how the two stages are provided, illustrates construction, gives specifications. Also discusses briefly control systems for use with forced-draft and induced-draft furnaces. National Airoil Burner Co., Inc.

OTHER EQUIPMENT

159 Magnet Idea Kit—A "one-a-month" information kit on permanent magnet application ideas is available to qualified plant engineers. The "basic kit" consists of a permanent binder with six looseleaf pages of application ideas. Each month company plans to issue a new sheet to be sent to those who requested the basic information. The first ideas presented include use of magnets on conveyors, on sheet steel separators, on floor separators. Carboloy Dept., General Electric Co.

160 Engineering Data for Heating Systems—A great deal of helpful information on heating systems is presented in Engineering Data Manual 2695, 28 pp. Detailed, illustrated information pertaining to heating problems is given. Besides covering heating terminology, there are sections on steam data, water properties, piping data, weights and measures, and pipe and fitting dimensions. C. A. Dunham Co.

161 Induced Draft Fans—Manufacturer's induced draft Bifucator fans, said to provide controlled draft for boilers and furnaces at all times, are the subject of this 8-pp Bulletin DB-32-32 catalog. Illustrations, specifications and dimensions of these fans in 24 sizes for both high pressure and low pressure boilers are provided. DeBothezat Fans Div., American Machine and Metals, Inc.

162 Spray Nozzles—Twenty-pp Bulletin 6-A contains complete technical details on atomizing and spray nozzles. Detailed information, given separately for atomizing nozzles, spray nozzles and spray nozzle clusters, includes construction details, spray characteristics and capacities. Dimension tables, capacity charts and drawings. Schutte and Koerting Co.

163 Hardboard Design Guide—This 20-pp illustrated booklet on uses of company's Presdwood in the fields of furnishings, machinery and manufacturing, power, lighting, electronics and others. Photos, text, tables and sketches show uses and advantages, manufacture, types and sizes, working properties. Masonite Corp.

164 Pliers and Wrenches—Catalog 66 is a 24-pp ordering book on hand tools. Fully illustrated, covers adjustable wrenches and a wide variety of pliers. Includes price list. Utica Drop Forge and Tool Corp.

165 Button-Head Screws—Form 856-3, on a new line of button-head socket screws, cites advantages of the button head, and illustrates applications. Also gives sizes and prices. Standard Pressed Steel Co.

166 Thinking of Microfilming?—A service for placing records permanently on microfilm is outlined in 8-pp Bulletin BSD-5. The service provides an analysis of records to determine which should be filmed, preparation for microfilming, certified microfilming, indexing of films. Remington Rand Inc.

(More Bulletins on page 196)

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PUMPS, COMPRESSORS

201 Centrifugal Pump Handbooks—Two instruction booklets covering installation, operation and repair of company's single-stage single-suction and multi-stage centrifugal pumps are available. They include illustrated description of such late developments as Magic-Grip couplings, universal joint couplings with Magic-Grip bushings, mechanical seals. Suggest regular inspection procedures and include pages for maintenance records. Also provide handy reference tables explaining how to locate trouble and listing causes and cures. Bulletin 08X7813, 24 pp, covers single-stage pumps; Bulletin 08X7780, 48 pp, covers the multi-stage pumps. State choice or both. Allis-Chalmers Mfg. Co.

202 Installing a Pump — Blaming many pump operating troubles on improper pump selection and installation, this 8-pp technical article tells what should be taken into consideration when ordering a pump. Titled, "Studying the Installation," it discusses head, viscosity, pipe friction, suction lifts, horsepower and materials. Illustrated. Viking Pump Co.

203 Data on Pumps — This 12-pp condensed catalog covers turbine-type and centrifugal pumps for a wide range of industrial uses. Gives construction specifications, capacities, application information as well as reference to specific literature on each type. Fully illustrated. Also includes data on mixed flow pumps, sump pumps. Aurora Pump Co.

204 "A Turn for the Better" — Bulletin 30-B, 8 pp, discusses manufacturer's improved Moyno pump, explaining in detail its progressing cavity feature and showing how the rotary motion created provides continuous flow at positive pressure. Stresses performance advantages of the pump. Pump Div., Robbins & Myers, Inc.

205 Condensed Pump Data—Form 4383-J covers more than 20 types of general service pumps, rotary pumps, sump and drainage pumps, condensate units, self-priming units, stainless steel pumps and high pressure pumps. In easy-to-find tabular form, each model is pictured along with its characteristics, applications, and features. Goulds Pumps, Inc.

206 Rotary Pump Service Manual — The installation, operation and maintenance of rotary pumps are covered in 12-pp Service Manual 100-2. Subjects discussed include installing of foundation bolts, alignment, supporting vertical pumps, grouting, piping, suction lines, hot liquid pumps, rotation, packing, dismantling, reassembly, starting operation and standing idle. Warren Steam Pump Co., Inc.

207 Air Compressor Selection Data—Factors to be considered in selecting a compressor are discussed and selector charts provided in 20-pp Bulletin IDC 9302-3, covering manufacturer's Y and G air compressors. The Y line includes tank mounted and bedplate units, single- and two-stage types. Special features of each model are described, dimensions and ratings given. Westinghouse Air Brake Co.

208 Multi-Stage Compressors — Featured in 36-pp Bulletin 116 is a presentation of engineering data and performance characteristics to enable plant engineers to approximate power requirements, rotative speed and discharge temperature for most multi-stage centrifugal compressor applications. Clark Bros. Co., Inc.

209 Compressor Selection Chart — Based on normal applications handling air with atmospheric intake pressure, this chart simplifies selection of proper size compressor, giving quick comparison between discharge pressure pounds per square inch gage and piston displacement cubic feet per minute. The chart shows recommended compressor bore and stroke in inches. Worthington Corp.

210 Centrifugal Compressors—Twelve-pp Bulletin 109 describes and pictures single-stage centrifugal compressors for delivering large capacities of pulsation-free air or gases. Their functions, applications, ratings, construction features, arrangements and methods of control are presented. American Blower Co.

VALVES, TRAPS, PIPING AND ACCESSORIES

211 Efficient Flow Control — Data on bronze, iron, steel and corrosion-resisting valves in a wide range of types, for oil, water, gas and low pressure steam. Shows how valves are designed for service, low maintenance. The Wm. Powell Co.

212 For Quick Valve Selection — Here's a 20-pp catalog digest providing ordering and application information on gate, globe, angle and check valves in bronze, iron, cast and forged steel construction, also valve accessories and parts. Illustrated and thumb-indexed, includes pressure-temperature chart. The Ohio Injector Co.

213 Small Steel Valves—Illustrated Circular 134 describes a line of small cast steel valves for high pressure service. Tells how valves are built, where to use them. Gives dimensions, weights, prices on both globe and angle types. Walworth Co.

214 Automatic Valves — Pressure, flow, and liquid level controls for steam, air, gas and fluids are shown in 90-pp Catalog A-50. Includes sizes, prices, capacity charts, conversion tables. Davis Regulator Co.

215 Valve Maintenance Guide — "Prevent Valve Failure Before It Starts," is a 28-pp text on valve selection, installation, inspection. Pictures damaged valves, explains how damage could have been prevented. Discusses maintenance schedules, inspection jobs, lubrication, pipe line checking, threading, regrinding, disc replacement. Jenkins Bros.

216 Valves for Processing—General Catalog 1500 B, 20 pp, describes in detail the operation and performance of all of company's single seated valves—the Domotor, electo-pneumatic, handwheel and combination models. Optional assemblies for specialized applications are shown. Application information, operating characteristics given. The Annin Co.

217 Solder Joint Valve — Bulletin 103 describes a 100-lb valve for use with copper tubing. Gives working pressures, temperatures. Tells how to install a solder joint valve. The Kennedy Valve Mfg. Co.

218 Steam Trap Reference Manual—Bulletin T-1740, 24 pp, tells why and where steam traps should be used; explains desirable trap features. Advantages of company's impulse steam traps are described, their operation illustrated. How to figure trap sizes and how to size condensate return lines are told and capacity and pipe dimension charts and thermodynamic properties of saturated steam included. Yarnall-Waring Co.

219 Steam Hook-ups—This 64-pp manual on hook-ups for steam traps, air vents and temperature controls provides diagrams, size calculators, selection data on traps and regulators, properties of saturated steam, dimensions. Sarco Co., Inc.

220 Steam Trap Book—Catalog J, 44 pp, includes physical data and prices on cast semi-steel and forged steel inverted bucket steam traps, compound steam traps and ball float air and air relief traps; a handbook section explaining how to calculate condensate loads and select traps for all classes of equipment; a maintenance section. Armstrong Machine Works.

221 Solving Steam Trap Problems—This popular 36-pp catalog on steam traps contains specifications and capacities on steam traps, float traps, air release valves and pipe line strainers. Tells how to calculate condensation loads and select traps for all classes of equipment, including unit heaters, jacketed kettles, autoclaves, submerged surfaces, steam mains and header drips. Gives pointers on how to install traps and service them. The V. D. Anderson Co.

222 Steam, Air and Gasoline Traps — Catalog 751, 32 pp, is a recently issued trap ordering book with capacity tables, installation diagrams, and containing charts and formulas for determining proper size trap for specific applications. Covers thermostatic steam traps, expansion steam traps, weight-operated traps for steam, air, gasoline, pressures up to 1500 lb; separators. W. H. Nicholson & Co.

223 Steam Trap Selections — Twenty-pp Catalog 600 provides practical selection information on bucket type steam traps, float and thermostatic types, compressed air traps, air eliminators and strainers. Explains how basic design principle of company's Airxpel traps fulfills requirements of a good trap. Wright-Austin Co.

224 Manifold Discharge Piping Application — Manual 51-B, 34 pp, proposes an approach to design of discharge header systems based on partial or complete elimination of back-pressure effects on tied-in safety-relief valves. This principle is claimed to offer greater savings in cost of discharge piping. Farris Engineering Corp.

225 Industrial Gaskets—This highly informative 50-pp catalog covers an extensive line of gaskets and teflon products, including practically all types of metal, metal-asbestos and special gaskets as well as teflon stock. Includes both engineering and ordering data, application and installation tips. United States Gasket Co.

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226 Handbook on Fittings, Flanges — Catalog wf-1950, 68 pp, offers working information on seamless carbon steel welding fittings and forged steel flanges. Includes dimensional tolerances, thread standards and threading practice; service pressure ratings, physical and chemical requirements. Grinnell Co., Inc.

227 Packless Expansion Joints—Bulletin 35-51A offers 28 pp of up-to-date information on company's Corruflex joints, their design and installation and advantages over other means of providing for thermal expansion in pipelines. Construction features are explained and illustrated; simplified selection data include tables for determining amount of expansion in pipelines. American District Steam Co., Inc.

228 Piping Pointers — This is company's popular piping manual covering fundamentals of sound piping practices. Discusses various types of valve designs and how each should be used. Pictures and names more than 80 kinds of fittings and contains many illustrated how-to-do-it features. Included with the manual is an 8-pp valve selection guide. Crane Co.

229 Design Properties of Pipe—This 12-pp booklet consists of tables listing pipe

DATA FILE

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sizes and wall thicknesses currently established as standard, plus what is believed to be the most nearly complete tabulation ever published of dimensional properties of commercial steel pipe. Tube Turns, Inc.

MAGNETS

230 Magnets in Stock—A complete listing of stocked sizes and shapes of Carboloy Alnico permanent magnets is provided in 20-pp Bulletin PM-100. Contains pull curve and size information in tabular form on both cast and sintered types, as well as sizes and application data on holding assemblies, including sheet steel separators, magnetic retrievers and stands. A list of available patterns for various sizes of cast Alnico bars, blocks, rods, rings and sleeves is included, also tables of properties. Carboloy Dept., General Electric Co.

231 Magnetic Pipeline Traps—Bulletin B-203 describes magnetic pipeline traps for sanitary and standard applications. These permanent (non-electric) traps are designed to remove tramp iron from liquid flow lines and afford protection to processing equipment. Typical trap installation data given. Eriez Mfg. Co.

INSTRUMENTS, CONTROLS

232 Fundamentals of Instrumentation—Booklet 80-2 illustrated, offers 126 pp of information on instrumentation in industry. Separate sections are devoted to the fundamentals of measurement and control, measurement of process variables, remote transmission of measurements, automatic controllers, power units and final control elements, control systems and panelboards. Available to qualified plant engineers. Brown Instruments Div., Minneapolis-Honeywell Regulator Co.

233 Wide Range Regulator—Featured in Bulletin 316 is an expansion stem type temperature regulator operated by water or compressed air. Explains how regulator works. The Powers Regulator Co.

234 Gages for Many Jobs—Sixty-eight pp of liberally illustrated information is offered in Catalog 64. Describes a variety of gage types; air volume controls for pump installations, vapor tension thermometers, d-c ammeters and voltmeters, and water flow meters covered. Includes engineering tables. United States Gauge Div., American Machine and Metals, Inc.

235 Handbook on Automatic Controls—Catalog 700 provides 45 pp of ordering and application data on automatic controls with mercury contact switches. Covers control equipment for temperature pressure-low water, liquid level, botties; transformer-relays, valves. The Mercoid Corp.

236 For Liquids Worth Storing—Bulletin 6405 offers an illustrated discussion of company's self-contained gages for liquid level applications, covering both direct- and remote-reading types, also a dial type hydrostatic gage. Stresses value of measuring stored liquids. Liquidometer Corp.

237 Heating-Air Conditioning Controls—A complete and informative ordering book for thermostats, motor-operated valves and accessories for heating, ventilating and air conditioning applications is offered in 48-pp Catalog F-1753-3. Compiled to aid in selection of control equipment to meet rigid specifications. Barber-Colman Co.

238 Electrical Instruments—A line of instruments for production testing, plant maintenance and service is shown in 16-pp Bulletin A-16-B. Among these are a-c clamp volt ammeters and a-c clamp ammeters, circuit testers, analyzers, mutual conductance tubechecker, pocket-size meters. Weston Electrical Instrument Corp.

239 Time Saving Volt-Ammeter—Manual 110, 16 pp, "How to Make Your Job Easier with the Amprobe," describes the handiness of this pocket-size volt-ammeter in installing, repairing, servicing electrical equipment. Pyramid Instrument Corp.

240 Meter for Corrosives—Bulletin OG 403 describes and pictures a stainless steel industrial meter specifically designed to handle corrosive liquids. Pictures receiver and transmitter, gives dimensions and specifications. Rockwell Mfg. Co.

241 For Combining Control Signals—The improved design of company's Ratio Totalizer is described and pictured in color in 8-pp Bulletin 5452. This simplified, versatile mechanism is a pneumatically operated control for combining input control pressures and spring forces, and producing an output control pressure based on addition, subtraction, multiplication, division or more complicated functions of the input control signals. Hagan Corp.

ELECTRICAL

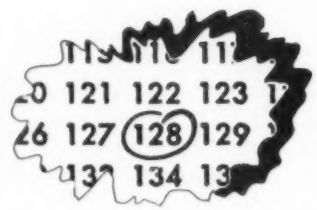
242 Buyers' Manual on Motors and Control—Fifty-pp Catalog GEC-1009 presents buying information on a carefully selected group of motors, motor starters, control accessories and electronic control. Ratings listed are those most frequently required. Excellent selection data, dimensions, ratings and prices. General Electric Co.

243 Motor Control—A handy reference book on modern motor controls, comprises 76 pp of condensed information, dimensions and prices of the most popular items in company's line. Covers a-c manual and magnetic across-the-line switches; a-c voltage starters, control relays and contactors; synchronous and high voltage starters; d-c control relays, contactors, starters; drum switches, a-c d-c rheostats, speed regulators, etc. Allen-Bradley Co.

244 Motor Handbook—Bulletin MU-185 provides 66 pp of engineering and descriptive data on motors, covering splash-proof and explosion-proof types, gear motors, motors for use in chemical plants, for oil well pumping, punch presses, elevators, cranes and hoists. Wagner Electric Corp.

245 Weatherized Motors—Six-pp Bulletin 400 describes company's All-Weather integral motors for industrial use. These have full height protection, through ventilation, one-piece steel shell, interchangeability of end head. Robbins & Myers, Inc.

246 Distribution Duct Engineering Data—Bulletin 427-4 contains 32 pp of data for estimating ventilated duct for feeder, circuits, plug-in duct, and plug-in duct for branch circuits. Includes instructions for laying out distribution duct jobs, and pointers on estimating diagrams, layout symbols. BullDog Electric Products Co.



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247 Bus Duct Manual—Booklet B-4272A, 68 pp, on bus duct and accessories, presents application and test data, specifications, information on pricing a typical installation. Describes advantages of bus duct for a secondary power distribution system, carrying current from transformers to switchgear—and from there to motors, etc. Westinghouse Electric Corp.

248 Plug-In Power—Sixty-pp Catalog 25 offers real help on electrical installation problems involving portable tools, materials handling equipment, cranes, hoists, cutting equipment. Covers a prefabricated trolley busway electrical distribution system to provide outlets for power or light where needed. Feedrail Corp.

249 Power Distribution Feeders—Catalog TEB-1, 40 pp, on heavy-duty units for main feeders in distribution systems, gives construction, engineering, application data. Trumbull Dept., General Electric Co.

250 Small Bus Duct—Detailed information on a midget-size bus duct is contained in Bulletin 703. Illustrates entire unit, also trap and hanger. Text discusses major parts, design features. Includes list prices. Frank Adam Electric Co.

251 Power and Control Cables—Sixty-pp Catalog 24 describes typical power and control cable designs and is intended as a guide in selecting proper wire and cable type. Describes insulations, sheaths and coverings, electrostatic shielding, and includes product data on all types listed. Rome Cable Corp.

252 FHP Manual Starters—Bulletin 224 is a folder giving the features and ratings of a line of fractional horsepower manual. List applications for these starters and pictures variety of enclosures available. Square D Co.

253 Power Circuit Transformers—By means of comparative wiring diagrams, 12-pp Bulletin 501-15 demonstrates the economy and system simplicity afforded through the use of company's power circuit transformers in handling lighting and low voltage features of these dry type transformers, their use in converting old installations, isolating service. Jefferson Electric Co.

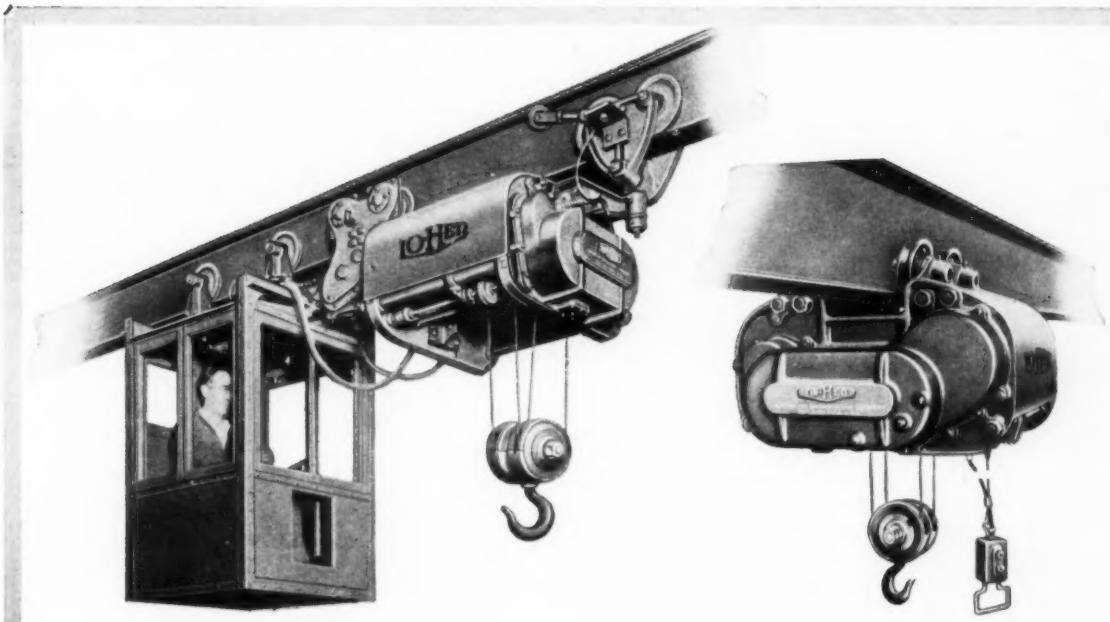
254 Automatic Voltage Regulators—Bulletin S-351 provides 12 pp of excellent selection data on company's automatic voltage regulators of the instantaneous electronic and electro mechanical types. Explains principles of operation of both types, their special features and applications. The Superior Electric Co.

255 Snap Action Switches—Catalog 82, 23 pp, on precision snap-action switches, presents safety, limit, and interlock types designed especially for switching a-c circuits in industrial applications. Covers heavy-duty limit switches, metal enclosed switches, some of which are sealed against dirt, dust, splashing. Micro Div., Minneapolis-Honeywell Regulator Co.

256 Overload Relays—Bulletin 1180-3 is a technical data sheet on overload relays designed to combine advantages of thermal and magnetic tripping characteristics for protecting a-c motors. Pictures design details. The Electric Controller & Mfg. Co.

257 Battery Technology Handbook—This is a 56-pp revised edition of company's manual of technical instruction and engineering data on the care of motive power storage batteries. Major addition is a section on charging, which includes information on modified constant voltage and two-rate charging, boost, equalizing and emerging charging, control of discharge, etc. Other sections cover the theory of the lead-acid battery; practical tips on care and operation; maintenance and repair. Gould-National Batteries, Inc.

258 Preventive Maintenance Tips—Booklet B-5477, 28 pp, discusses programs designed to reduce shut-down time on production lines and treats in detail the



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(Begins on page 169)

maintenance of power equipment. A suggested schedule of work and cleaning on power equipment is presented in chart form. Essential information on preventive maintenance for turbines, generators, switchboards, motors and controls is given. Westinghouse Electric Corp.

LIGHTING

259 Recommended Lighting Systems—This 16-pp article describes six lighting systems adaptable to most industrial plants. They include systems for illumination levels 20 to 40 ft-c, for levels of 40 to 60 ft-c and for levels of 60 to 100 ft-c, and involve use of filament, fluorescent, and mercury lighting and combinations of these. Explains lighting classifications, and discusses advantages of each type of lighting. Lamp Dept., General Electric Co.

260 Industrial Lighting at Work — Sixteen pp Booklet B-4727 stresses three ways of putting better lighting to work; cutting costs by promoting more production; increasing efficiency by ensuring accuracy, and reducing accidents by exposing dangerous operations. Analyzes mercury vapor and incandescent light sources as to efficiency, service life, maintenance, mounting height and job suitability. Luminaires of each type are pictured; wattage and lumen output ratings. Westinghouse Electric Co.

261 Selection Data on Lighting Fixture Hangers—Catalog 50, 80 pp, contains general and detailed information on disconnecting and lowering lighting fixture hangers, accessories, special devices and parts. Utilizes 247 photos and drawings to show construction principles, operating features, installations, modifications and component parts for both indoor and outdoor units. The Thompson Electric Co.

262 Plant Lighting Planning Guide — This 32-pp handbook of industrial lighting presents economics of a plant lighting program in terms of lower production costs, reduced working time, less fatigue and eyestrain, less spoilage, fewer accidents, better morale. Explains six major steps in initiating, developing and carrying out a lighting program; tells how to select equipment and stresses importance of maintenance. Includes table of recommended levels of illumination for industrial interiors. Benjamin Electric Co.

263 Lamps for All Purposes—Catalog 53-54-E is an excellent 28-pp buying guide for a wide range of incandescent, fluorescent lamps. Fully illustrated, presents helpful application information. Features full color photos showing the effect of various types of fluorescent lighting. Duro-Test Corp.

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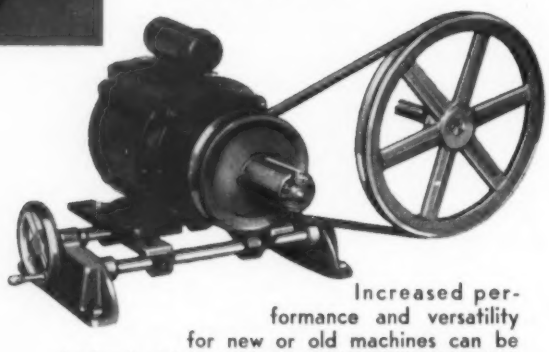

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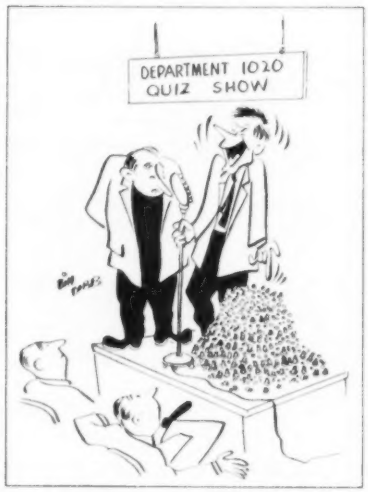
MECHANICAL POWER TRANSMISSION

264 Variable Speed Control Simplified—Bulletin 700 contains some 40 pp of descriptive, application and engineering data on variable speed pulleys and selective speed transmissions. Illustrations show how old and new machines can be equipped with efficient variable speed control. Lovejoy Flexible Coupling Co.

265 V-Belt Drive Design Book—Providing 54 pp of engineering data on manufacturer's Bull Dog belts, this catalog gives general drive information as well as simplified methods of selecting V-belt drives, V-flat drives and several types of non-standard drives. Includes selection tables, prices. Boston Woven Hose & Rubber Co.



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266 Manual on Power Transmission Machinery — Containing 225 pp of data, this illustrated handbook covers roller bearings, V-belt drives, friction clutches, couplings, collars, sleeve bearings, pulleys, take-ups and hangers. Provides engineering data, formulas. Dodge Mfg. Corp.

267 Oilless Bearings for Conveyors — Technical Catalog 210, 20 pp, gives detailed information for specifying, installing and use of bearings for screw and roller conveyors, together with operating characteristics. The sectionalized catalog provides

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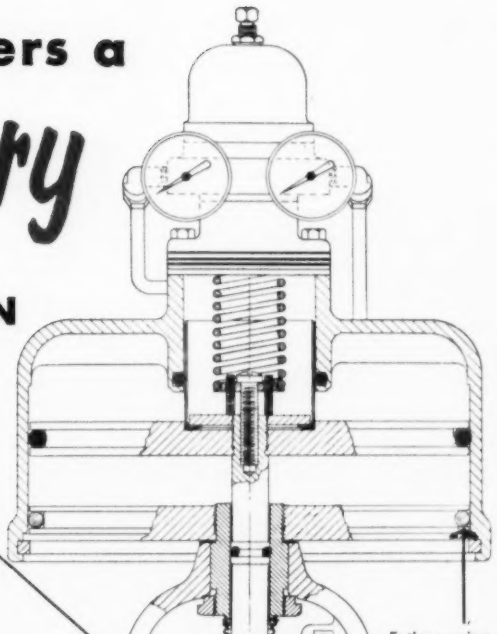

Entire moving assembly of the motor is insulated against metal to metal contacts through the use of specially designed "O" rings.

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DATA FILE

(Begins on page 169)

tabular data and dimensional drawings to facilitate identification of bearings for replacement. Arguto Oilless Bearing Co.

268 Improved V-Belts — This literature on company's Vulco rope drives explains how this rope with concave sides is designed to fill out to a precise fit in the sheave groove, to provide less wear, more pulley contact and more sure power when needed. The Gates Rubber Co.

269 Power Drive Handbook — Catalog 709, describing roller chains and sprockets, includes tips on selecting stock roller chains for every type of power drive service. Diamond Chain Co., Inc.

270 Belts to Suit the Job—This bulletin presents company's "inner-locked" woven duck belting available in types for general elevating and conveying and general power transmission applications as well as special jobs. Imperial Belting Co.

MATERIALS HANDLING

271 For Efficent Overhead Handling — Bulletin C-1, 56 pp, pictures overhead equipment for practically all industries. Stresses construction, safety, electrical advantages of trolleys, cranes, track and auxiliaries. Includes layout information. The American MonoRail Co.

272 Data on Tramrail Equipment — Twelve-pp Form 2008F is a well organized booklet on tramrail systems. Tells what an installation can do toward improving handling efficiency. Rail and arch design, switches, cranes and transfer bridges, carries, hoists, cranes, buckets, grabs are pictured. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

273 Handbook on Overhead Conveying Systems — Manual A-56 provides 200 pp of information on overhead track systems and conveying equipment. Pictures installations, construction details; gives engineering data. Richards-Wilcox Mfg. Co.

274 For Overhead Handling—This 12-pp illustrated catalog covers motorized and hand operated cranes and monorails engineered for efficient, low-cost handling. Special construction features are detailed; accessory equipment shown. Abell-Howe Co.

275 Metal Conveyor Belts — This 24-pp booklet is an illustrated guide to selection of metal conveyor belts. Presents both conventional and balanced spiral weave belt; covers raised edge and flight constructions, chain edge constructions, high temperature belts, wire conveyor aprons. Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp.

276 Feeders, Conveyors — An excellent presentation of electric vibrating feeders and conveyors is given in 90-pp Catalog 830 covering manufacturer's line of equipment for handling a wide variety of wet and dry materials and including large and small capacity units, for temperatures of -30 to 2000 F. Explains principles of design, operation. The Jeffrey Mfg. Co.

277 Pneumatic Conveying — Technical information and data on handling bulk materials with company's Airstream conveyors are presented in 24-pp Bulletin 529. Diagrams basic types, charts principal applications. Includes case history studies in various industries. Dracco Corp.

See pages 37-38 and 167-168 for postage-free mailing cards. Use them to ask for bulletins — just circle item number of all those wanted.

278 Tubular Conveyors — Form HC-541 contains about 44 pp of data on tubular conveyors for moving almost any flowable material. Shows basic types of these conveyors, tells what they're designed to do and how they are applied. Lists materials being handled to advantage with them, and discusses benefits. Gives engineering data, installation instructions. Hapman Conveyors, Inc.

279 Conveyor Belting—Twelve types of conveyor belting, for standard, heavy duty and special applications, are described in this bulletin. Pictures the beltings in use, and discusses in detail some of the impregnations and coatings utilized. Main Belting Co.

280 How to Pick a Truck—Catalog 54, 8 pp, features a step-by-step procedure for making the best fork truck choice for a particular handling job. Other sections in the booklet show at a glance complete specifications on each of company's trucks, and illustrate important construction and design features. The Baker-Raulang Co.

281 Trucks, Handling Equipment—Bulletin 170A gives an over-all picture of company's portable and hydraulic freight elevators, other equipment. Revolvator Co.

282 Data on Truck Casters — As much specific information as can be presented in a catalog for commercial usage is included in 105-pp Catalog 124 on truck casters. Besides specifications, ordering data and photos, this well-indexed book includes load capacity charts, defines caster terminology, tells how to select casters and install them. The Bassick Co.

283 Trucks, Casters, Wheels — Catalog 50, 65 pp, covers platform trucks, super-

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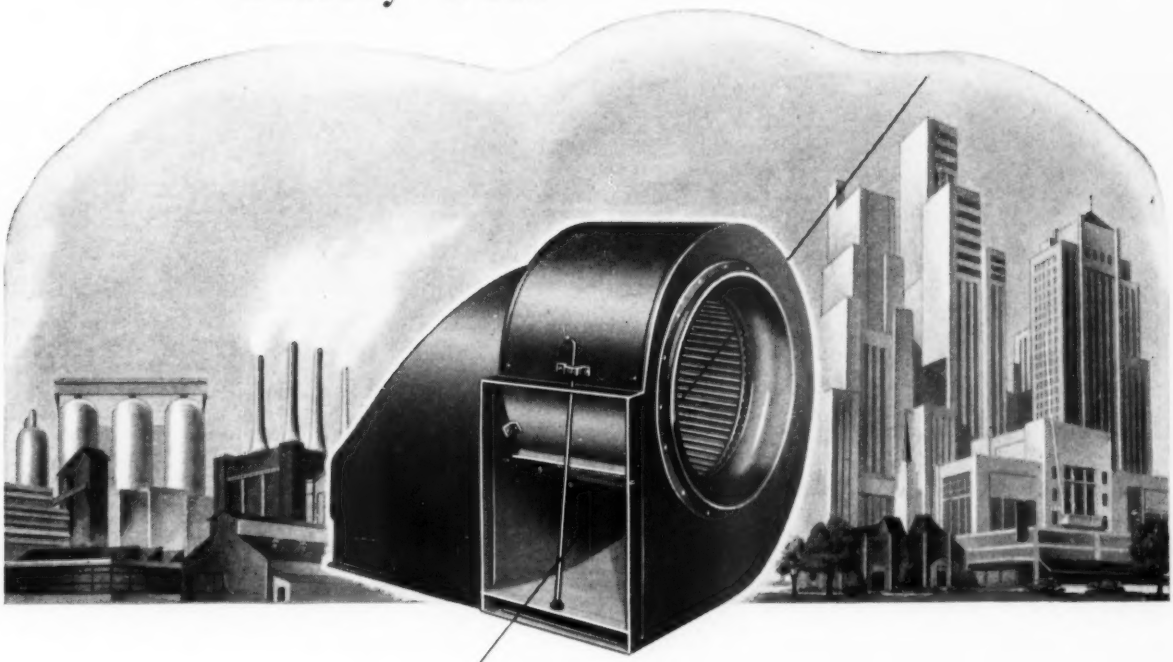

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(Begins on page 169)

structures, two-wheel and pry trucks, dollies, trailers, casters, wheels, offering a wide range of chassis, superstructure and wheel combinations. Thomas Truck & Caster Co.

284 Industrial Truck Reference Guide—Bulletin 300, 44 pp, covers company's line of current model tractors, trailers, fork lift trucks, platform lift trucks and load-carrying trucks. Major categories are: the trackless-train system; the fork-truck pallet system; and the lift truck-skid system. Each category is preceded by an analysis of applications and merits of the handling system. Mercury Mfg. Co.

285 Shovel and Loader — Described in 12 pp Bulletin 1032 is a hydraulic crown and hoist shovel and loader incorporating mechanical features usually associated with big shovels. Illustrates, gives specifications, application information on both pneumatic traction and crawler traction models. Dempster Bros., Inc.

286 Materials Handling Equipment — Illustrated Catalog P602 is a 44-pp guidebook on materials handling equipment for industrial plants. Subjects covered include description and application data on company's gas and electric fork lift trucks, motorized hand trucks, hand lift trucks and hand and electric hoists. The Yale & Towne Mfg. Co.

287 Industrial Logistics — Form A-9516-4450 is a 12-pp booklet covering strategic handling of materials from raw state to distribution. Discusses master unit load and transportation cycle. Explains company's system of adapting all loads to four types of containers, assembling maximum numbers of these into master unit loads, and transporting them as single units. The Elwell-Parker Electric Co.

288 Safe Truck Operation — "Safety Saves!" is a 24-pp booklet setting forth "do's" and "don'ts" established as a practical code of truck operation. The admonitions, pointed up by cartoons, serve as both "refresher course" and text. Industrial Truck Div., Clark Equipment Co.

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289 Fork Lift Trucks—Bulletin 1570, 8 pp, describes the Diesel or gasoline powered FT series of company's lift trucks available in capacities from 3000 to 7500 lb. Partial assembly pictures point out maintenance and control features, and charts show dimensions. The Buda Co.

290 Material Flow Equipment — Revised 28-pp Catalog GC-52 presents conveying equipment, including power and gravity conveyors, hand trucks and industrial casters, with photos, drawings and specifications. New heavy-duty conveyor is discussed, and a belt centering device is detailed. The Rapids-Standard Co., Inc.

291 Portable Power Scaffold—The portability and job versatility of the Roll-o-Hoist scaffold is stressed by text and photo in Bulletin 1000. Optional gas engine and electric power drives are described as are tip-over buckets for use with the scaffold. St. Anthony Machine Products Co.

292 Sheet Lifters — Operational and design features of company's sheet lifting equipment which contribute toward efficient handling, flexibility and economy are explained in Bulletin S-25, 16 pp. Cullen-Friestedt Co.

293 All-Purpose Lifts—"Let Big Joe Do It" is a bulletin on hydraulic lifting units. Features a heavy duty model for lifting loads to 52 in. height. Big Joe Mfg. Co.

294 Electric Hoist Manual—Catalog 215-B offers 38 pp of engineering, application and ordering information on company's Load Lifter electric hoists. Presents hoists with hand operated trolleys and with power travel, hoists with lug suspension, hook suspension and push-type trolleys, and with hand-geared trolleys, hoists for low head. Manning, Maxwell & Moore, Inc.

295 Trolley Hoists — Bulletin DH-269, 2 pp, describes and pictures ½ to 3 t capacity army-type trolley hoists, plain or geared, for use where a close headroom assembly is required. Gives dimensional and capacity data, prices. Wright Hoist Div., American Chain & Cable Co., Inc.

296 Chain Hoists — Catalog 61, 32 pp, covers a line of chain hoists, telling how to select and use them. Provides an illustrated comparison chart of hoist types, a selector table and discussion of factors to be considered in buying a hoist. Multiple gear chain hoists, screw gear chain hoists, differential chain hoists described separately. Reading Crane & Hoist Corp.

297 Manual on Electric Hoists—Catalog H-46, 44 pp, covers monorail and stationary hoists and car pullers. Explains fundamental types of grabs, methods of hanging I-beams, types of hoist suspensions, controls. American Engineering Co.

298 Locomotive Cranes—Catalog 84, 16 pp, stresses advantages of the torque control unit used in company's cranes, and features illustrations of the mechanism and converter unit. Describes in detail the sealed anti-friction bearings, air controls, brake, limit switch and other components. Gives complete clearance dimensions, and rated lifting capacities. Orton Crane & Shovel Co.

HEATING, COOLING

299 Heat-on-Wheels for Industry—Illustrated Form 3574, 16 pp, is the story of how manufacturer's portable heaters can solve emergency heating problems. Shows how these heaters provide extra heat for the hard-to-heat spots, and for extra cold areas, to spot heat where needed, and for ventilating, drying and thawing jobs. Herman Nelson Div., American Air Filter Co., Inc.

300 Forced Air Space Heaters — Illustrated Bulletin 523-B, 12 pp, is devoted to a line of forced air heaters for comfort heating, year-round ventilating, tempering make-up air, process drying and heat curing. Explains design efficiency, construction details, operating principle and flexibility of application. Advantages of the heaters compared with other types of heating units are detailed. These heaters are direct fired by oil, gas or combination fuels. Dravo Corp.

301 Heating Equipment and Systems — Sixty-pp Catalog G-99 presents up-to-date ordering information on company's heaters and hot water heating specialties, also design tables and engineering data for venturi systems, two-pipe reverse return systems, panel heating systems, snow melting systems. Contains a parts list and section on servicing of circulators, valves, flow checks. Taco Heaters, Inc.

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302 Simplified Radiation Heating — Convector radiators designed for connection directly into process steam lines and for operation at pressures up to 150 psi are described in this bulletin. Explains how heat emission rate increases with pressure, and stresses high heat output, good drainage, low surface temperature. Shows ceiling, wall installations of these compact units. Shaw-Perkins Mfg. Co.

303 Faster Tank Heating, Cooling—Bulletin IP-250, 8 pp, describes company's Platecoils, embossed metal sheets welded to form compact units through which required heating, or cooling, medium is circulated under pressure. Explains lower costs, faster tank cooling or heating, lighter weight and compactness of these units. Kold-Hold Mfg. Co.

304 Heat Transfer Equipment — An excellent source of information on shell and tube heat transfer equipment, 28-pp Catalog DM-1150 covers heat exchangers, tank suction heaters, oil preheaters, condensers, evaporators, after-coolers, gas coolers, centrifugal pumps and water heaters. Instructions for installation, operation and maintenance are included. Bell & Gossett Co.

MAINTENANCE

305 Corrosion-Preventive Coatings—This 16-pp illustrated booklet covers a family of products for fighting corrosion. Presents characteristics and application data on hot and cold applied tar base coatings, alkyd resin coatings, chlorinated rubber base coatings, vinyl and phenolic coatings. Includes finder chart. Protective Coatings Div., Pittsburgh Coke & Chemical Co.

306 Building Maintenance — Handbook 7 offers 64 pp of information on floor surfacings, leak stoppers, external wall sealants, road patching, roofing materials. Includes instructions for use. Flexrock Co.

307 What to Do About Sashes—Problems and suggested methods for economical maintenance of steel and wood sash are outlined in "Trouble-Free Sash Maintenance." Subjects covered include importance of making buildings tight and draft-free, comparison of putty and mastic glazing for windows, value of caulking openings between sash and masonry, methods of painting. The Tremco Mfg. Co.

Postage-free Reader Service Cards make it easy to order any of this literature. See pages 37-38 and 167-168

308 Roofing Manual — Engineering data on roofing is given in Specifications 50, 30 pp. Covers coal tar pitch roofings, waterproofings, insulations, flashings, protective coatings. Includes illustrated instructions. Tar Products Div., Koppers Co., Inc.

309 Basic Roofing Information — "What You Should Know About Your Roof" is a 40-pp, clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioration, what to do to keep a roof in good condition. Discusses recommended roofing practices, essentials of a good re-roofing job, also, roofing materials. Johns-Manville.

310 Maintenance Manual — "Over the Rough Spots" is a 48-pp pocket size booklet giving the answer to practically every repair or building maintenance problem. Tells how to patch holes and resurface floors, how to prevent water seepage in underground foundations, repair leaky roofs, preserve concrete or wood surfaces,

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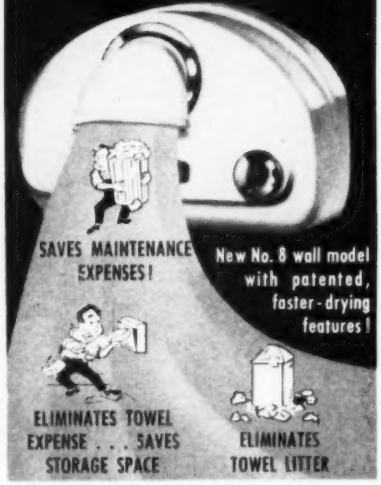
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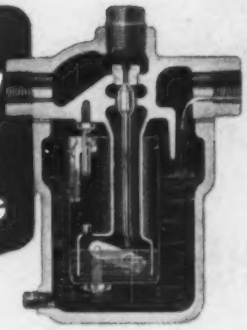

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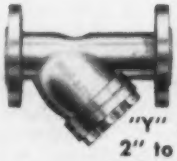

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(Begins on page 169)

protect structural steel from rusting, and gives many time and labor saving methods. Generously illustrated. Stonhard Co.

311 Iron Cement Handbook — This is a 40-pp pocket-size catalog of iron cements for repair, other uses. Tells how to mix and apply them. Gives illustrated instructions for dozens of repair and maintenance jobs. Smooth-On Mfg. Co.

312 Power Sweepers—Bulletin S-101 pictures and describes power sweepers for industrial, commercial plants. Comparative operating data are given on each sweeper as a guide to selecting correct model and size. Chart showing savings in man hours and sweeping costs afforded is included. Wilshire Power Sweeper Co.

"Good Heavens! Take that right back where you found it!"

313 Vacuum of Many Jobs — Bulletin 144, 20 pp, describes and illustrates 132 unusual industrial uses for company's vacuum system. The Spencer Turbine Co.

314 Floor Scarifier — Bulletin 83.4 describes and pictures a new hydraulically equipped machine designed for removal of traffic-packed grimes from trucking aisles in industrial plants. Explains how it cuts, picks up grime in one operation; is one-man operated. G. H. Tennant Co.

CONSTRUCTION

315 Industrial Steel Windows — Planned to offer comprehensive easy-to-find data, this 24-pp catalog gives descriptions, specifications, sizes, uses and advantages of Fenestra pivoted windows, commercial projected windows, and security windows used separately and in combination, also continuous windows used mainly for top-lighting in monitor and sawtooth roof construction. Detroit Steel Products Co.

316 Technical Manual on Plywood — Available basic data on Douglas fir plywood, its properties and use, are offered in looseleaf sections with firm binder. Presents engineering information about this panel material and its performance in varying applications. Covers commercial standards, designing with plywood, prevention of condensation, lateral bearing strength of nailed plywood joints, deflection. Please give your title when requesting this book. Douglas Fir Plywood Assn.

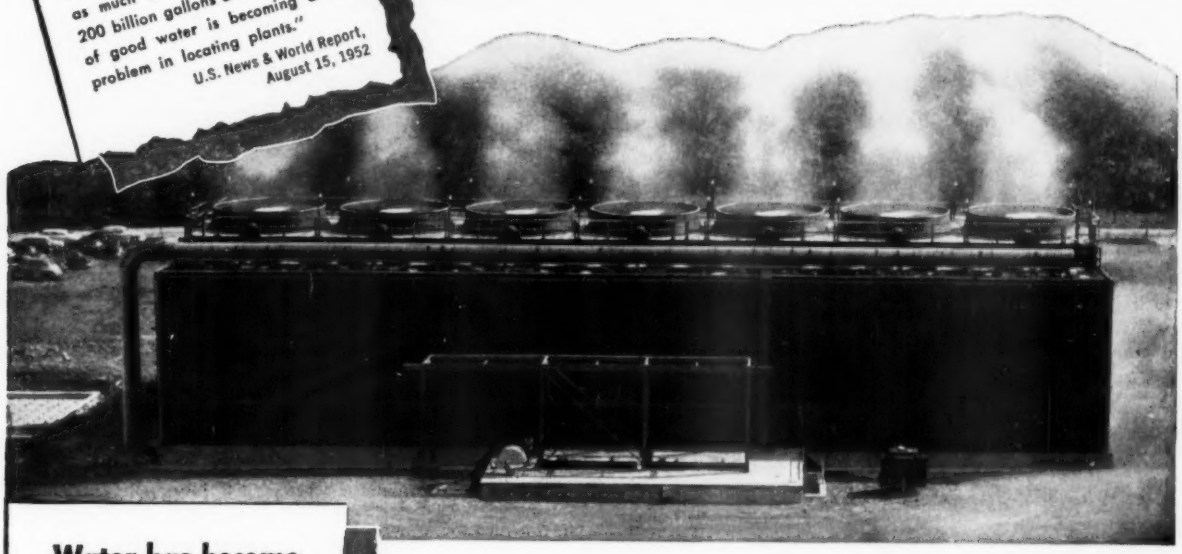
317 How to Glaze with Plexiglas — Sixteen-pp Booklet PL-23 gives detailed information on glazing industrial and other

this Marley Cooling Tower will be *twice as valuable tomorrow!*

2½ times as much water in 1975...

. . . And there's industrial water — water used by industries for cooling or washing, or as a material. Industry will be needing 2½ times as much in 1975 — something like 200 billion gallons a day. Shortage of good water is becoming a key problem in locating plants."

U.S. News & World Report, August 15, 1952



Water has become a problem...

"Even water, once regarded as a 'free commodity' of virtually unlimited supply, has become a problem. . . . The essence of the . . . problem is *costs*."

Fortune, August, 1952

Industry will spend about $10 billion more...

"The waste of our civilization threatens one of our vital resources: water. . . . It is estimated that . . . U.S. industries will probably have to spend about $10 billion more . . . " (to handle waste water in the next 20 years).

Scientific American, March, 1952

In 1975, according to reliable estimates, American industry will require 2½ times as much water as it does today. It follows that the ability of your present cooling equipment to conserve water will be of much greater value tomorrow when water is twice as scarce. Provided, of course, that the cooling towers you buy now are still operating in 1975.

If you buy Marley towers today, you are investing in this added value, for only Marley offers the rugged, service-proved structural features that assure such long-term, trouble-free performance. Marley provides today the design refinements that will still be modern in years to come—full height louver walls . . . open distribution . . . MortisLocked filling . . . mechanical equipment engineered exclusively for cooling tower service.

Many Marley towers have been in service for 25 years —and continue to deliver cold water day in, day out. That's why, no matter what your term of amortization, you will find a Marley cooling tower among your major assets long after it has been written off the books.

For a sound investment in the future of your company, buy your next tower from Marley, world's leading producer of water-cooling equipment.

MARLEY

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Offices in 50 Cities

Kansas City 5, Missouri

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958 Concerns and Communities
... big and little ...
have discovered*

HOW TO CUT ONE ESSENTIAL ITEM OF DAILY MAINTENANCE EXPENSE 75%

*WILSHIRE Power Sweepers

The man with a broom is never through! As fast as he reaches one end of the plant or the street, the other end is cluttered up again. He keeps sweeping ... and you keep paying ... day after day ... year after year. A needless waste of time and money!

1 man with 1 WILSHIRE Power Sweeper sweeps 6 to 38 times faster than 1 man with 1 broom. That means you keep factory and warehouse floors, yards, parking areas, streets, alleys ... everywhere a man can handle a broom ... cleaner, safer and more sanitary. And it costs you *less* than you are now paying to do it the inefficient, hard way. In fact, your WILSHIRE Sweeper will pay for itself in just a few months.

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IN CANADA - PLANT MAINTENANCE EQUIPMENT CO. - VANCOUVER & TORONTO

For more facts circle 621 on Reply Card

DATA FILE

(Begins on page 169)

buildings with flat panels of the acrylic plastic Plexiglas. Written for plant engineers concerned with frequent breakage of windows or other glazing problems. Gives properties and behavior of this plastic sheet. Plastic Dept., Rohm & Haas Co.

318 Aluminum Building Sheet — Stressing advantages of aluminum for siding and roofing, 12-pp Form AD-247 presents both dimensional data and engineering details covering its use. Provides illustrated suggestions for use of fasteners, flashing details, directions for applying the sheet. Includes tips on painting, welding, storing. Aluminum Co. of America.

319 Non-Slip Flooring—Algrip, an abrasive rolled steel floor plate described as non-slip even on steep inclines, is the subject of Booklet A-5, 8 pp. Discusses safety features; gives fabricating data, sizes, allowable loads. Pictures some applications. Alan Wood Steel Co.

320 Glass Block Fenestration—The natural ventilation characteristics of glass block fenestration are presented in this illustrated report of a test project. In some 88 pages, report covers sun hoods, window types, dual outlets, air speeds, double loaded variations, reverse draft and ventilation below window sill. Test data is summarized and recommendations included. Although test was conducted on glass block fenestration in school buildings, the information will be of interest to those concerned with industrial applications of glass block. Kimble Glass Co.

TOOLS, WELDING

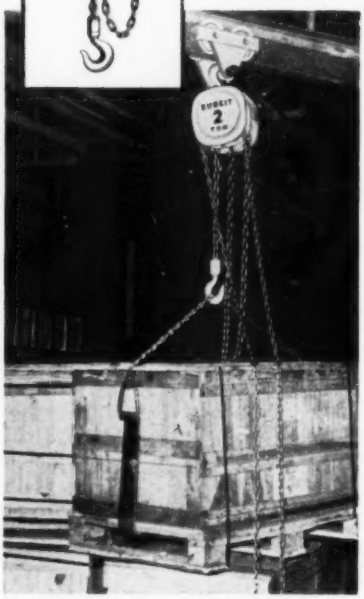
321 Pipe Tool Book—This catalog and data book gives information on pipe and bolt machines, power units, ratchet threaders, reamers and cutters, other power and hand tools. Includes popular "operating guide" section, fully illustrated with easy-to-grasp drawings. Beaver Pipe Tools, Inc.

322 Idea Book — Sixty pages of "1001 Shortcuts" for production, construction and maintenance make this hand-tool and hydraulic-tool handbook one of the most useful ever. Large photos and concise descriptions give ideas developed and successfully applied by hundreds of tool users. One of the big values attached to the "Idea Book" comes from the manner in which it stimulates the user to create his own ideas. Typical job photos suggest the general principles of the applications. Blackhawk Mfg. Co.

See pages 37-38 and 167-168 for postage-free mailing cards. Use them to ask for bulletins — just circle item numbers of all those wanted.

323 Metal Spraying Gun — Company's Type 4E gun for high-speed spraying with all metals is described in Bulletin 94. A cutaway drawing shows construction features of the gun which is designed for

MOVE INTO SPEED LIFTING



Every spot-lifting job is a job the 'Budgit' Aluminum Chain Block can handle faster and better. It's a knockabout hoist — a light, portable hoist anyone can carry, hang up by himself, and operate. The ¼-ton size weighs a mere 29 pounds. You can lift the full load with a 25-lb. pull on the hand chain. Other available capacities are: 1,000, 2,000, and 4,000 lbs.

Learn why the 'Budgit' Aluminum Chain Block can't be matched by any other manually operated chain block in speed, ease of use, safety, durability, economy by reading Bulletin No. 398. Write for a copy.

'BUDGIT' I-BEAM TROLLEYS —

enable your chain blocks to travel the load as well as lift it. Made of tough steel. Adjustable to fit various I-Beam sizes. Ball bearing equipped. Capacities: 500 to 4,000 lbs. Priced from $13.50 Write for Bulletin No 390.

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'Budgit'®
CHAIN BLOCKS

MANNING, MAXWELL & MOORE, INC.
MUSKEGON, MICHIGAN

Builders of "Shaw-Box" Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties. Makers of 'Ashcroft' Gauges, 'Hancock' Valves, 'Consolidated' Safety and Relief Valves, and 'American' Industrial Instruments.

For more facts circle 622 on Reply Card

WHEREVER rigid piping must be connected to machinery

USE CMH FLEXIBLE METAL HOSE

YOUR GUIDE TO MOTION CONTROL

Catalog 130 gives specifications for all types of CMH hose. Write for a copy or see the Flexonics catalogs in Chemical Engineering Catalog and Sweets Plant Engineering File.

By using CMH Flexible Metal Hose as the connecting link between rigid pipe and machinery, you solve two otherwise serious problems—the elimination of damage to the piping because of vibration and the compensation for any misalignment that may exist. Properly installed, CMH Flexible Metal Hose will give long, dependable, trouble-free service without further attention.

Whatever your flexible connection problem, there is a CMH hose type to meet your needs. Corrugated and convoluted types are available in a wide variety of designs and in a complete range of sizes. CMH Flexible Metal Hose is offered in steel, bronze, stainless steel and other alloys to fill your requirements. Your Flexonics distributor will give you further data. Look for his name in your classified telephone directory or we will be pleased to send it to you.

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In Canada: Flexonics Corporation of Canada, Ltd., Brampton, Ontario

Flexible metal hose

Expansion joints

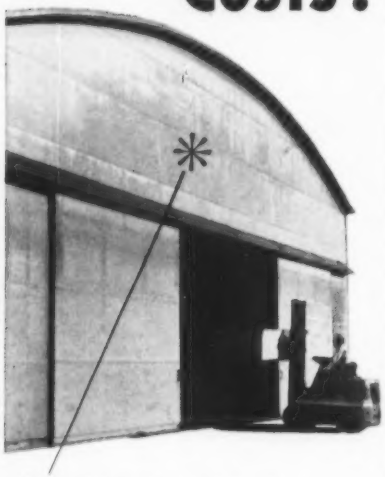
Aircraft components

Metallic bellows

For more facts circle 623 on Reply Card

Looking for Ways to

Cut Building Costs?



✳ **Builders Report Savings of $10 per Square with Fir Plywood Siding-Sheathing**

YOU CAN side and sheath in one economical operation with PlyShield® grade Exterior fir plywood.

Builders report savings of $10 per square—and more—with these husky, attractive, easy-to-apply panels.

Fir plywood siding has extra strength and rigidity, eliminates the need for sheathing on many industrial and commercial buildings. Durable, too. Exterior plywood has 100% waterproof glue. Weatherproof. Easy to paint. Big panels cover large areas quickly, cut in-place cost to minimum.

It's today's best buy! Check your regular plywood source. For 1953 Basic Plywood Catalog, write Douglas Fir Plywood Association, Tacoma, Wash.

Douglas Fir
Plywood

These Trademarks Identify Quality-Tested Fir Plywood

PLYSHIELD® is the versatile "one-side" grade of Exterior-type for siding, many other outside uses. Identified by Plyshield keystone on panel back, EXT-DFPA® on panel edge; 100% waterproof glue. Interior-type grades for inside use. Plastic-surfaced and hardboard-faced panels for special jobs.

EXT-DFPA

THERE'S A TYPE AND GRADE FOR EVERY USE

For more facts circle 624 on Reply Card

DATA FILE

(Begins on page 169)

tool-post mounting or hand operation. Metallizing Engineering Co., Inc.

324 Tube Working Handbook—Form 369-A is a 32-pp booklet on tube working tools. A section on modern tube working practices covers handling, cutting, flaring, reaming, refacing or fittings, bending, soldering and other operations. Company's line of tools is described. The Imperial Brass Mfg. Co.

325 Portable Spray Gun—An easily used and inexpensive spray gun pressurized with a CO_2 cartridge is featured in this single sheet bulletin. Sketches show the gun in use for painting, cleaning, other work. Sullivan-Becker Machine Co.

326 For Faster Fastening — Form 35-A explains and illustrates company's system of fastening tools and fasteners for use with steel, wood, concrete, fabricated hard materials. Ramset Fastening System, Inc.

327 Powerful Puller—Introduced in Bulletin 97-A is the compact Power-Twin, a fast-working hydraulic ram. Shows how this ram, with its center hole feature, can convert all of company's pulling systems to hydraulic push, pull or lift operation. Owatonna Tool Co.

328 For Efficient Welding — Form ADC 717-B is a 12-pp booklet describing equipment and supplies used in company's inert-gas-shielded metal arc process. Covers guns for manual operation as well as a head for automatic operation. Wires for use with this equipment also described. Air Reduction Co., Inc.

VENTILATING, DEHUMIDIFYING, AIR CONDITIONING

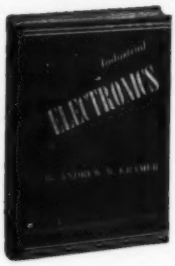
329 How Conditioning Units Can Help—The advantages of self-contained units in cooling, dehumidifying, cleaning are cited in 40-pp Catalog 1307. Explains installation, operation. Provides data on direct expansion and cold water cooling, hot water, steam heating. Clarage Fan Co.

330 Improved Air Conditioning—Advantages and applications of a controlled humidity method of air conditioning are discussed in Bulletin 112. Process is explained, illustrated. Niagara Blower Co.

"No, not yet . . . better let it blaze up a little more."

331 Putting Air to Work—Catalog 600 is an excellent, 60-pp reference text on air and products to put it to work. For plant engineers concerned with heating and ventilating of plant areas; air conditioning installations; means of exhausting fumes, gases and dusts; conveying chips and granular materials; elimination of airborne dirt—this book is a valuable tool. It's

a practical book about Electron Tubes



. . . what they are
. . . how they work
. . . how they can be used
. . . what they can mean to you

Industrial
Electronics
by Andrew W. Kramer

This new book explains in clear, simple, non-technical style the basic principles of electronics, and how these principles can be applied in industry. Electronics has been solving the unsolved problems. Whether it is navy beans, opening doors at a shadow, or measuring the thickness of red-hot steel plates, the electron is the newest and most efficient force captured by science. This book should be invaluable for the practical maintenance or operating executive or engineer. 311 pages, 229 illustrations, $6.00.

CHAPTER HEADINGS: Electron Behavior, Fundamental Principles of Electron Tube. The Simplest Thermionic Tube—the Diode. The Triode. Further Aspects of Triode Characteristics and Operation. Electronic Generation of Electric Oscillations. Multielement Tubes. Effect of Gas in a Tube. Types of Characteristics and Operation. Mercury-pool Tubes. Photoelectric Tubes and Cells. Cold-cathode Tubes. Special-purpose Tubes. What Tubes Can Do. Electronic Control and Regulation. Application of Electron-tube Rectifiers. Electronics in Instrumentation and Measurement. Industrial Applications of Electronic Control. Application of Electronic Regulation. Electron Tubes in Light Production. Miscellaneous Electronic Applications.

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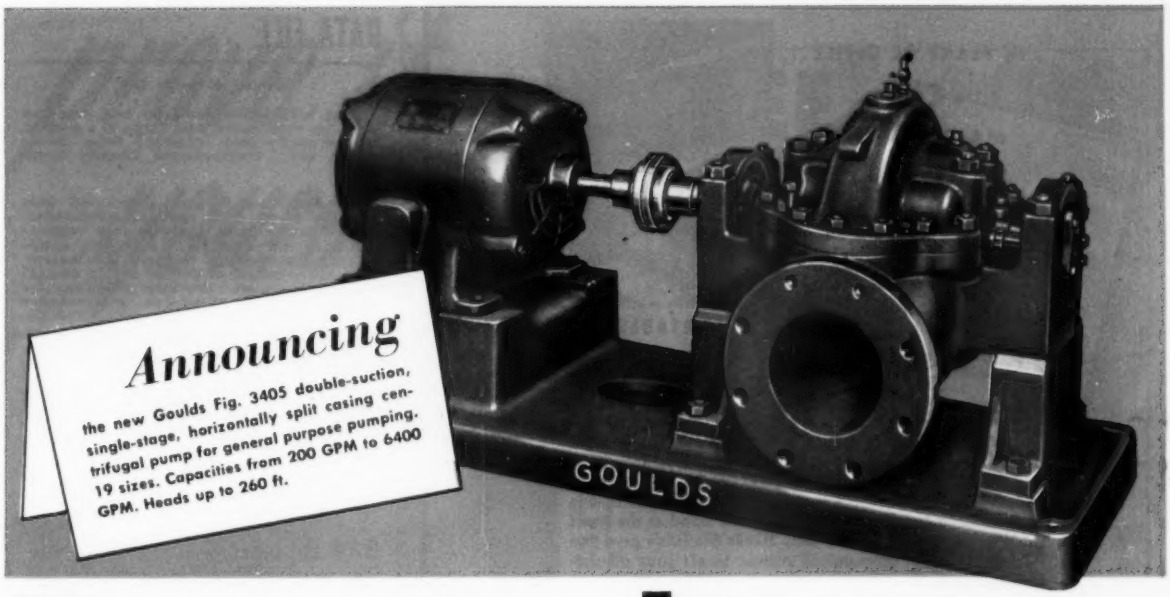
Announcing
the new Goulds Fig. 3405 double-suction, single-stage, horizontally split casing centrifugal pump for general purpose pumping. 19 sizes. Capacities from 200 GPM to 6400 GPM. Heads up to 260 ft.
GOULDS

This new pump gives you 5 big cost advantages

The price you pay is only one element of the cost of a pump installation.

Good engineering practice also figures in the cost of pump breakdowns, low operating efficiency, change-overs to meet new conditions, replacement parts inventories, even the floor space the installation takes up.

Here's why the new Goulds centrifugal pump is designed to improve your cost experience in every one of those elements.

1. ***It combines seven design features that mean maximum operating efficiency and minimum maintenance.***

Every one of these construction features is standard with this new design. Together they offer you, without extra cost, a quality of service that's unique in its approach to general liquid handling.

a. Renewable stuffing box bushings.
b. Bearing housings sealed against moisture and dirt.
c. Cowl-type glands suitable for use with quenching liquids.
d. Stainless steel impeller keys.
e. Teflon water seal rings.
f. Die-formed stuffing box packing.
g. Corrosion resistant gland bolts.

2. ***Interchangeability of parts.***

With only three shaft and rotating parts assemblies to provide for 19 pump sizes and 38 pump combinations, this new design offers you a remarkable range of interchangeable parts. A glance at the interchangeability chart on page 7 of the descriptive bulletin will show you:

a. how this design gives you great flexibility in making field changes should your pumping requirements change;
b. why the first cost of this unit is so low due to standardization in manufacture; and
c. how this interchangeability helps to reduce spare parts inventories.

3. ***Compact construction.***

You will be particularly pleased with the short over-all length of this new design. Short bearing spans cut lengths as much as 50%. This means a real saving in floor space.

4. ***Flexibility of stuffing box.***

You can use either conventional stuffing boxes or mechanical seals depending on requirements. And you can change from one to the other in the field if need be.

5. ***Easy rotation change.***

A unique device, locking shaft seals, permits you to change from right-hand rotation to left-hand rotation or vice versa in the field without construction changes.

More than 50 years of experience in meeting industry's needs for general purpose centrifugal pumps come to a climax in this design.

GET FULL DETAILS **This 12-page illustrated bulletin, No. 721.6, covers the complete details of the new Goulds Fig. 3405, including specifications, interchangeability tables and performance curves. Be sure you have the whole cost-advantage story before you select another general purpose pump. Contact your nearest Goulds representative or mail the coupon below today.**

GOULDS PUMPS, INC., Dept. PG, Seneca Falls, N.Y.

Please send me Bulletin No. 721.6 describing the new Fig. 3405 centrifugal pump.

Name_____

Company_____

Address_____

City_____ State_____

Goulds PUMPS INC. Seneca Falls New York

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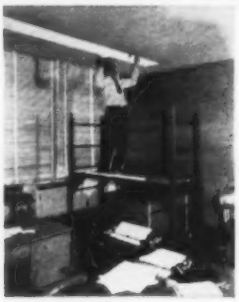
IN PLANT OR OFFICE...

CUT MAINTENANCE COSTS with BAKER SCAFFOLDS



- SAFE
- ADJUSTABLE
- PORTABLE
- EFFICIENT

Baker Adjustable steel scaffolds enable men to do more work in less time and at less cost. Patented self-locking platform support trusses permit fast erection and dismantling. No bolts, nuts or loose parts. Complete with metal-bound plywood platform that is adjustable every 3 inches. Workmen stand at the most efficient height for their job. Baker Scaffolds give you the safe, sure, economical answer to all your off-the-floor work.

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One Sure Way to CUT COSTS!

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C-F SHEET LIFTER

The A. B. Dick Company, Niles, Illinois, found that this C-F Lifter has substantially reduced man hours and crane time required to move stock in and out of storage.

Up to 10,000 lbs. of high grade sheets in varying widths may be picked up, carried and unloaded at shears or machines with speed and economy by the Lifter and its operator.

C-F Lifters are made in standard or semi-special models to handle from 2 to 60 tons. Bulletin SL-25 describes the advantages you can obtain from C-F Lifters. Write for it today.

CULLEN-FRIESTEDT CO.
1317 South Kilbourn Avenue • Chicago 23, Illinois

For more facts circle 628 on Reply Card

DATA FILE

(Begins on page 169)

packed with information on selecting and applying equipment, and there is a section of frequently-used reference data. Sturtevant Div., Westinghouse Electric Corp.

332 Fans and Blowers—Illustrated Catalog 21A, 64 pp, gives ordering information on company's fans, blowers, roof ventilators and related products, including application suggestions, ratings, dimensions. Explains principle of curved orifice air-seal ring incorporated. Provides directions for installation and operations, maintenance and lubrication. Hartzell Propeller Fan Co.

333 Efficient Dehumidifying — Bulletin 222 is the 32-pp recent edition of company's popular booklet showing how modern dehumidifying equipment solves moisture problems for industry. Illustrated by 70 photos and diagrams of installations, describes many production, handling and storage problems solved by installing manufacturer's Lectrodryers. Covers their use in storage areas, in materials handling, spot drying. Pittsburgh Lectrodryer Corp.

334 Air Conditioning Cabinets — Engineering Bulletin 3703A, 40-pp, describes and illustrates manufacturer's Model G cabinets, central units available in both horizontal and vertical models, providing 875 to 22,000 cfm and offering combinations for any function or functions of air conditioning. Booklet gives construction details, discusses heating and cooling coils. Buffalo Forge Co.

335 Heating, Air Conditioning Book — Bulletin PB-290, 36 pp, is a complete, condensed catalog covering company's full line of air conditioning, heating, ventilating and heat transfer equipment. Supplements some 40 specialized bulletins on various product lines. The Trane Co.

336 To Keep Out Moisture—Vents designed for easy installation on any roof to keep out wet, foul air are described in this literature. Muckle Manufacturing Co.

337 Vaneaxial Fans — Bulletin J-611 is a 16-pp booklet presenting company's Axivane Series 1000 fans. Explains advantages of vaneaxial design and the versatility afforded by adjustable blades for ventilating and other industrial applications. Fans in this line consist of 136 models from 18 to 84 in. dia., volumes to 150,000 cfm. Photos of typical installations included. Joy Mfg. Co.

338 Tubing for Many Jobs — Flexible tubing for ventilation, fume and dust removal as well as materials handling is described in 8-pp Catalog C2-4. Gives detailed information on company's Spiratube A and Spiratube B, two types of lightweight tubing made from continuous helical coils of spring wire wound with overlapping plies of fabric. Gives applications of both types. Flexible Tubing Corp.

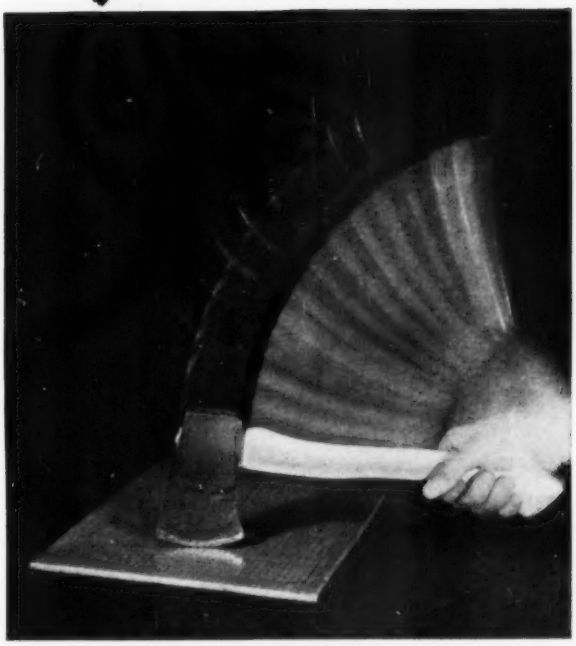
339 Push-Button Ventilation — Six-pp Bulletin 680 gives sizes, dimensions and performance data on power roof ventilators for flat, curved or peak roof installations, capacities to 78,800 cfm. Cites advantages of ventilation by positive air displacement. Propellair Div., Robbins & Myers, Inc.

340 Heavy Duty Ventilation Filters — Form DPF-100.LH presents a dry panel filter with a filtering area of 23 sq. ft. Tells features, uses; includes installation data, filter selection chart. Dollinger Corp.

DUST CONTROL

341 Wet Method Dust Collection — Besides presenting company's line of Multi-Wash dust collectors, dewatering tanks and pumps, 22-pp Bulletin 510 explains advantages of wet method of dust control, discusses both simple installations and those requiring additional equipment. Covers in detail the widely used Senior collector, the Junior collector for single function opera-

prove it yourself!



Main ARMADILLO BELTS

resist more cutting abrasion than any other conveyor belting on the market.

In fact, an axe dropped on an ARMADILLO belt, as illustrated, will not penetrate the coating.

This tough, glass-like yet flexible belt withstands cutting abrasion and actually sheds oil . . . of any kind . . . of any quantity. ARMADILLO is ideal for conveying oily steel scrap, metal tote pans, sharp-edged stampings, artillery shells, etc.

ARMADILLO . . . *the toughest belt in the Main line.*

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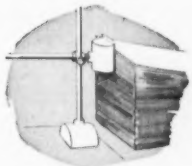
PERMANENT MAGNET IDEA LITERATURE KIT

Shows you how Carboloy magnets can speed up your shop work . . . save you time, money

In holding steel plates to conveyors, for example . . .



separating tin sheets to prevent feeding doubles . . .

holding work steady for drilling and grinding . . .

or for recovering tools from dip and coolant tanks.

NOW, see how Carboloy permanent magnets can eliminate clamps, jigs, vises, fixtures and other costly units . . . speed up jobs, retrieve tools, perform all sorts of unique and useful services around your plant.

Send for free kit containing handy magnet ideas you can put to work at once – complete with diagrams, full details. Send today, and from time to time, we'll send you other free application suggestions that will really pay off for you.

PERMANENT MAGNET BENEFITS

Carboloy permanent magnets need no electric power, have no operating parts. Give off stable, powerful energy that lasts permanently . . . are not affected by heat, moisture, vibration . . . cost nothing to operate. Write today for the full story and for your *free* magnet idea kit. No obligation, of course.

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Shop Package No. 1 – Contains 48 Carboloy permanent magnets: 8 styles – 3 pairs each. Magnetic pull up to 2 lbs. per magnet. Price $10.00. Get yours now!

Shop Package No. 2 – Contains 18 magnets: 4 styles – 2 pairs each, and 1 style – 1 pair. Magnetic pull from 3 lbs. to 12 lbs. per magnet. Price $15.00. Order today!

"Carboloy" is the registered trademark for the products of Carboloy Department of General Electric Company

CARBOLOY **PERMANENT MAGNETS**
DEPARTMENT OF GENERAL ELECTRIC COMPANY
11199 E. 8 Mile Ave., Dept. C., Detroit 32, Mich.
Plants at Detroit, Michigan; Edmore, Michigan; and Schenectady, New York

For more facts circle 631 on Reply Card

DATA FILE

(Begins on page 169)

tions, settling and dewatering equipment. Claude B. Schneible Co.

342 Dust Control—Bulletin 98 explains value of industrial dust control and principles of dust suppression, collection by filtration. Describes dust control equipment, providing specifications, dimensions on filters, systems, automatic controls. The W. W. Sly Mfg. Co.

343 Dust Recovery — "Engineered Efficiency in Dust Collection and Recovery," 36 pp, discusses industrial dust recovery from standpoints of nuisance abatement, waste avoidance, hazard elimination. Shows effect of variation in particle size distribution and specific gravity of dust on efficiency of the dust collecting system. Buell Engineering Co., Inc.

344 Dust Control Technology — Detailed selection, operation and maintenance data are contained in this 50-pp digest-size book, "Industrial Dust Control Through Exhaust Systems." Treats exhaust hoods, piping systems, dust collecting equipment, exhausters and drives. Lists basic methods of dust control and analyzes elements of exhaust systems. Pangborn Corp.

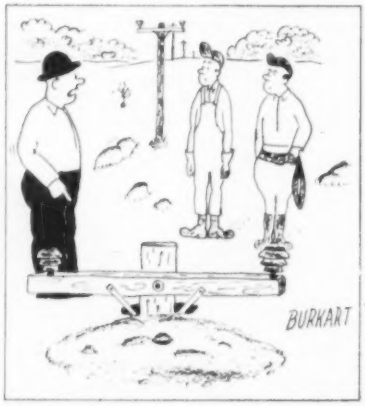
345 Manual of Exhaust Hood Design—Bulletin 270-E1, 24 pp, features engineering data on dust control systems for the metal working industries. Illustrates and discusses the design of exhaust hoods for many operations in this field. Also, 61 photos of dust control installations show various methods of hooding dust sources. American Air Filter Co., Inc.

346 Tubular Dust Filters — Advantages, uses and design of tubular dust filters are given in Bulletin 24-D. Presents both single compartment and automatic continuous multi-compartment units. Describes bag shaker mechanism, dust discharge valve, dust hoppers. Ruemelin Mfg. Co.

347 Dust Control Brochure — Dust and fume control in many industries is the subject of this comprehensive 24-pp booklet. Tells how cloth-tube type dust collectors are handling complex problems in 33 typical installations, all illustrated. Covers use of these collectors in chemical processing, coal cleaning, sewage disposal, many other applications. American Wheelabrator & Equipment Corp.

FUEL OILS, LUBRICATION

348 Force Feed Lubricators—This catalog describes and illustrates force feed lubricators for positive and automatic lubrication of cylinders and bearings. Stresses accessibility of enclosed working parts, other design features. Manzel.



"Who's the joker that dug this hole?"

349 Versatile Industrial Oil — Described in 20-pp Form AD 4078 is an all-purpose oil offering protection for a wide range of industrial equipment, and available in 15 viscosity grades. Discusses six major characteristics of the oil; explains and pictures its use in hydraulic systems, speed reducers, air compressors, electric motors, hydraulic turbines, bearing systems, etc. A chart shows grades and uses, physical properties. Standard Oil Co. (Ind.)

350 The Why, What and How of Lubricants — This 20-pp booklet explains and illustrates common tests and terms describing lubricants. Covers viscosity, flash and fire, neutralization, number, penetration, specific gravity, extreme pressure, steam emulsion corrosion. Tide Water Associated Oil Co.

351 Lubricant Data Book—This pocket-size 56-pp booklet gives product information and principal uses of approximately 40 lubricants of both grease and fluid types, and general directions for proper application. Discusses lubricants requirements of equipment in 25 major industries. Lubriplate Div., Fiske Bros. Refining Co.

352 Diesels, Their Fuels and Lubricants —This 46-pp book gives practical information on diesel engines, covering their history and economics as well as design characteristics and operating principles. Classification of diesels according to their speed is explained. Sinclair Refining Co.

353 Multi-Purpose Grease—This bulletin describes Gargoyle Grease BRB No. 1, intended to provide correct lubrication for practically all normally loaded anti-friction and plain bearings. Tells how it resists leakage, protects against rust and corrosion. Socony-Vacuum Oil Co.

354 Cooperative Technical Consultation Service—This 24-pp booklet presents company's periodic consultation service offered to industrial plants and aimed at efficient use of petroleum products. Covers

How to load 54 freight cars and trucks at a time

Three-level conveyor with 54 unloading stations

• In October, 1946, 14,940 feet of Standard Rexall Belting (12" wide, 4 ply) was installed on the conveyors pictured here. Brewing Corp. of America, Cleveland, Ohio, uses this unusual three-level conveyor system to load 54 freight cars and trucks at a time.

The oustanding performance of this belting is indicated by re-orders for additional Standard Rexall Belting for use on expanded facilities at this plant.

Made from heavy, tightly woven 37½-ounce silver duck, Standard Rexall Belting is double-stitched with inner-locking stitches to permanently prevent ply separation. It is impregnated to preserve the belt and to produce a smooth, hard low-friction surface that is ideal for deflection and slider-bed service. Power requirements are 25% to 40% less than for rubber belting.

Imperial Belts are custom-made to give maximum service under specific conditions. Write for Data Sheet 48-1 and let us show you how to cut *your* conveying costs.

Imperial BELTING CO.

1759 S. Kilbourn Ave., Chicago 23, Ill.

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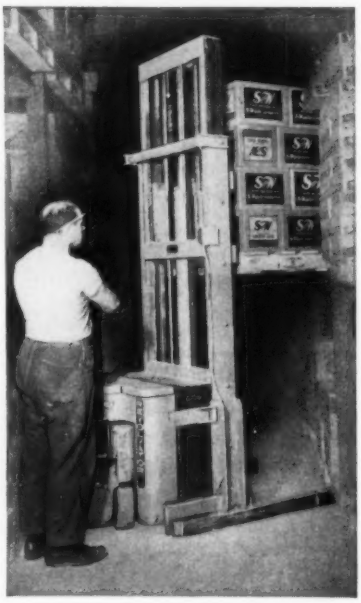

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Revolvator Go-Getter — telescopic straddle type lift truck — a bear for work in crowded areas, narrow aisles. Fully automatic — extraordinarily maneuverable 200° turning arc — 2500 lb. capacity — very slight operator training necessary. Write for full details of this and many other models.

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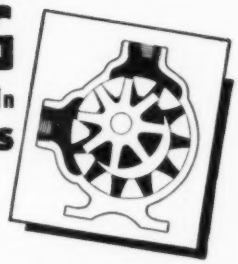
Builds The Full Line In ROTARY PUMPS



The designing, testing, manufacturing and applying of Viking Rotary pumps is VIKING's one and only job.

What does this actually mean to you? It means that the energy, the development, and the output are at no time devoted to some other product.

The result is a superior rotary pump in a greater range of sizes and types to really fit *your* needs better.

Investigate the *complete* Rotary Pump line — VIKING. Start with bulletin 53SZ.

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Viking PUMP COMPANY
Cedar Falls, Iowa

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HEAT EXCHANGER TUBE ENDS

In the past 31 years Conseco has provided millions of Flowrites for tube inlets of heat exchangers operating in all industries and all applications. Tube inlets become eroded and worn long before the remainder of the tube, and by reinforcing the inlets it is possible to increase the effective tube life many times.

Flowrites—made of the same metal as the tubes—are available in any length, diameter or gauge. They are easy to install and remove by unskilled help. When Flowrites themselves become worn (*instead* of the tubes!), just pull them out and install new, longer Flowrites.

Get the facts from the 8-page Flowrite "proof" booklet, available upon request.

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Increased Efficiency and Output of Workers by keeping each room or department at its proper temperature.

Cuts Heating Costs up to 25%—23% fuel savings reported by E. R. Squibb & Sons. With today's higher fuel costs bigger savings than ever before are possible with Powers control. It eliminates fuel wasted by OVER-heating with manual operation.

Precision Control for Processes—Wherever product uniformity and quality are dependent upon precise temperature and humidity regulation use Powers controlling, indicating or recording instruments.

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DATA FILE

(Begins on page 169)

services available in solution of lubrication problems, metalworking operations, processing, fuel and heating oils, dust control. Gulf Oil Corp., Gulf Refining Co.

WIRE ROPE

355 Wire Rope Handbook—Catalog G-15, 170 pp, is pocket-sized and thumb indexed, and one of the handiest available from standpoints of practical information, easy reference and clarity. Provides up-to-date information on a wide range of Preformed and regular type wire ropes, slings and fittings and includes a section of data helpful in selecting the right rope for the job, installing it properly and keeping it in condition to get best use from it. Macwhyte Company.

356 Wire Rope, How to Use It—Practical information on the use and care of wire rope is given in 72-pp pocket-size Catalog C-51. Covers unloading, storing, kinking, unreeling, installing, breaking in, methods of seizing and cutting, measuring, end preparations, many other pertinent factors. Fully illustrated with photos and sketches, treats splicing in detail and includes chapter on lubrication. Also presents data on wire rope constructions, efficiencies of fittings. Available to qualified plant engineers. A. Leschen & Sons Rope Co.

BOILERS, GENERATORS

357 Re-Circulation Steam Generator — Here's a 6-pp folder introducing a controlled re-circulation steam generator, describing its developments and uses. Combustion Engineering-Superheater, Inc.

358 How Much for Steam — Here's a "slide rule" calculator for computing steam costs. It's pocket-sized, and enables a plant engineer to find comparative steam costs per 1000 lb, using coal, oil or gas, and based on fuel costs of price per ton, gallon, cubic foot. Cleaver-Brooks Co.

359 Steam Generators—Twenty-pp Bulletin SB43, 20 pp, describes company's VL factory assembled generators combining 2-drum water-tube boiler, integral water cooled furnace, brick work, insulation and steel casing. A large cutaway illustration shows design details, and gas travel, circulation and furnace interior are also pictured. Use of the generator with various fuels and firing arrangements is covered, dimensions included. Erie City Iron Works.

360 Shop-Assembled Boiler — Sixteen-pp Bulletin G-76, completely describes and illustrates company's Type FM water-tube integral-furnace boiler, made in standard sizes from 2900 to 28,000 lb of steam per hr, pressure to 250 psi. Capacities, dimensions given. The Babcock & Wilcox Co.

You may use the two Reader Service Cards to request information on ads, too. Just circle the key number appearing at bottom of ad.

361 Packaged Steam Generators — This new 16-pp booklet on steam generators is profusely illustrated in color, providing photos, cut-away and schematic drawings and describing in detail the construction and operating principles. Explains induced draft, dry steam, four-pass downdraft design, 5 sq ft of heating surface per Bhp, flexibility of operation, and oil, gas and combination gas-oil burning equipment. Superior Combustion Industries, Inc.

362 Oil or Gas Fired Automatic Boilers —Boiler, burner, controls and safety features of 10 to 500 hp oil or gas fired automatic boilers are described in this 4-pp bulletin. Firing rates, dimensions and capacities are given for all models. Boiler Engineering & Supply Co., Inc.

SAFETY, SANITATION

363 Dry Chemical Extinguishers — New quick-acting fire extinguishers of the dry chemical type in 20 and 30 lb sizes are covered in Form C-104. C-O-TWO Fire Equipment Co.

364 Group Washing Equipment—Washfountains designed for modern group washing requirements for industrial plants and institutions are described and pictured in Bulletin D-766. Bradley Washfountain Co.

365 Advice on Washrooms—Information on company's washroom advisory service is available to plant engineers. Tells of plans and specific suggestions for improving washrooms which are included in this service. Scott Paper Co.

366 Dermatitis Prevention Program—"The Control of Dermatitis in Industry" is a 32-pp booklet on prevention of the skin diseases. Presents a program for providing personal cleanliness, protecting skin areas, preventing clothing contamination, guarding against special hazards. Lists conditions to be checked to determine cause of dermatitis. A 6-pp chart covering a wide range of industries lists various working conditions and types of dermatitis prevalent, and suggests preventive measures. West Disinfecting Co.

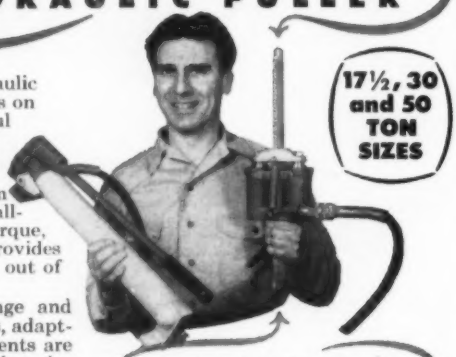
OTHER EQUIPMENT

367 Electrical Equipment for Cranes — A complete line of electrical equipment designed exclusively for crane service is presented in 32-pp Bulletin C5-1. Covers everything from company's a-c Magnetorque crane control to current collectors, and is generously illustrated. Overhead Crane Div., Harnischfeger Corp.

OTC

TOUGH JOBS! THEY'RE A CINCH WITH THE CENTER HOLE HYDRAULIC PULLER

The OTC Power-Twin Hydraulic Puller saves hours and dollars on every job. Compact, powerful . . . handles 95% of the pulling and installing operations in the average plant . . . can be used as a portable ram . . . speeds up pulling and installing jobs 75% . . . eliminates torque, friction . . . remote control provides safety. Takes the hard work out of pulling jobs.

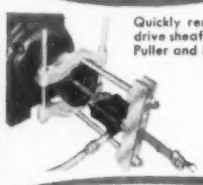


17½, 30 and 50 TON SIZES

Famous OTC Center Hole Ram permits fast, easy adjustment to the work and interchange from push-puller to sleeve puller to bench press.

A complete range and variety of pullers, adapters and attachments are available to pull or install bearings, gears, pinions, shafts, studs, wheels, pulleys, etc. Works wonders as heavy duty jack, spreader, straightener or compressor.

Amazingly efficient combination of Portable Pedestal Press and 17½ ton Power-Twin Hydraulic Puller. Every shop will find this unit a must...first few jobs pay for it in time, tools and money saved. Move it where you want it . . . **it's portable.**



Quickly removing multiple drive sheaf with OTC Push-Puller and Power-Twin.

See your jobber for complete information or write us.

OWATONNA TOOL COMPANY

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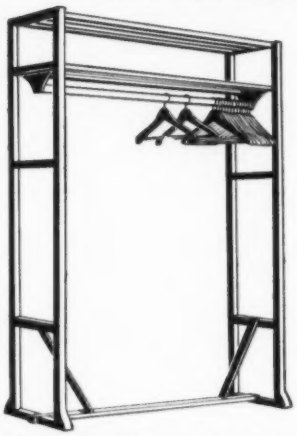
Checkerette

Portable Steel Coat Rack



This "knock-down" wardrobe rack answers almost any "wraps" problem, because it can be set up anywhere in a few minutes without nuts, bolts or tools . . . can be disassembled and stored in small space when not in use. It is ideal for installation near point of work, occupies only 1' by 4' floorspace; is ideal for company cafeterias, offices, laboratories and meeting rooms.

It will hold wraps by day and shop coats at night and keep both aired and dry.

Modern, efficient designs, welded steel construction, rigid in use (all members held under tension).

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LIQUIDOMETER Tank Gauge

- FOR GAUGING LIQUIDS OF ALL KINDS
- 100% AUTOMATIC
- APPROVED BY UNDERWRITERS' LABORATORIES

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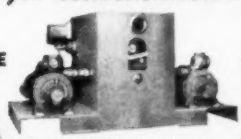
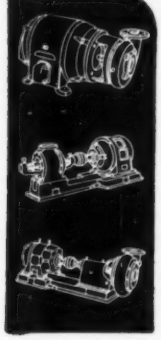
APCO *Packaged* CONDENSATION RETURN UNITS

for the SMALL LOW PRESSURE JOBS

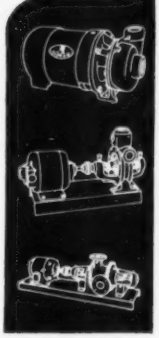
10 to 40 lbs. with 8, 15, 30 Gallon Receivers



Packaged Duplex Condensation Return Unit with No. 4 Series Apco Pumps.



Start saving valuable heat units with APCO Square Tank Units. Built to meet demand for a smaller unit with the superb performance of our larger units. Remember, the Pumps are Apcos. No Vapor Binding — Special Provision for Expansion and Contraction — No Frictional Wear within pump. Thus, ECONOMY.



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AURORA Always PUMPS

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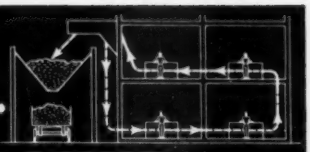
upstairs... downstairs...



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IF YOU HANDLE flowable materials similar to *any* of these **PRODUCTS:**

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YOU MAY REAP ENORMOUS SAVINGS— some of America's most cost-conscious firms are doing it — with plant-wide systems of Hapman Tubular Conveyors. The list of materials you can handle is almost endless. You gain great advantages, both mechanically and in terms of labor saved. The stakes are high — why not investigate now? Write today for Bulletin PE-253

Hapman CONVEYORS, INC.
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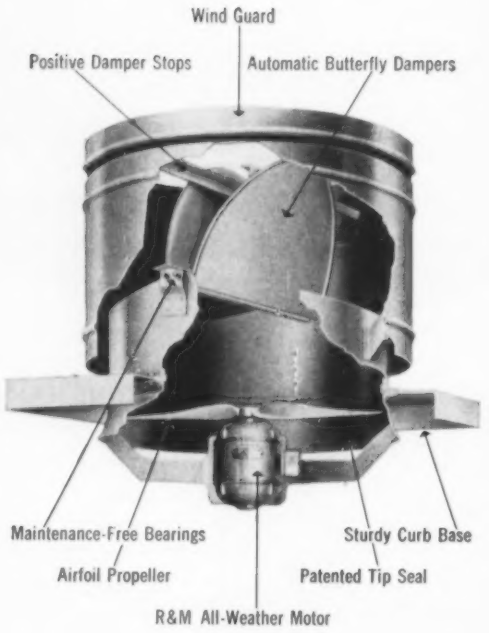
SKY-BLAST®

The Modern Power Roof Ventilator



Most economical way to expel heat, fumes, smoke

This modern power roof ventilator is backed by 20 years of research and engineering.

Famed airfoil propeller, powered by the *All-Weather* Robbins & Myers motor, sweeps up heat, moisture, dust, fumes—then *blasts them high into the outside air.* Wind guard and throat design assure constant performance regardless of wind.

Automatic butterfly dampers open wide on minimum fan pressure for guide vane effect and virtually unrestricted air flow. Galvanized roof over damper shaft and bearing supports provides rainshed when fan is not operating. Easily mounted on any type roof, Sky-Blast provides air deliveries up to 78,800 CFM. Low silhouette cuts down roof stresses. Our engineers will be glad to give you free advice on any ventilating problem.

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NO COMPRESSOR • NO HOSES
NO ELECTRICAL OUTLETS

USE IT ANYWHERE!

Here's a completely portable sprayer especially designed for the hundreds of industrial uses where costly, cumbersome compressor-type spraying is unnecessary. Sprays paints, oils, varnishes, water-proofing, fire-proofing, etc. Powerful CO_2 cartridge sprays up to one 21 oz. containerful at high pressure. Light in weight for easier spraying. Has brass and stainless inserts, heavy-gauge steel container, comfortable knurled handle grip, and cast aluminum head.

ONLY **$15.95** POSTPAID with 3 Cartridges

SEE YOUR DISTRIBUTOR or order direct postpaid. Extra CO_2 cartridges at your dealer's or 10 for $1 postpaid.

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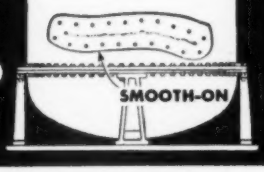
To Repair A CRACKED CASTING



Smooth-On No. 1 Iron Cement, under a bolted patch plate, saved this large casting without the use of heat, when a long crack threatened to end its usefulness. This simple repair is typical of the countless uses that engineers, mechanics and maintenance men in industrial plants find for Smooth-On. They keep it handy for both emergency and routine maintenance repairs—stopping leaks, sealing cracks, tightening loose parts. If your supply house hasn't Smooth-On No. 1 in 1-, 5-, 20-lb. or larger size, write us.

FREE REPAIR HANDBOOK

Sealing cracks in apparatus and pipe lines is only one of the many time-saving, money-saving repairs this 40-page book will show you. 170 illustrations. Write today for YOUR free copy.

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Do it with **SMOOTH-ON**
THE IRON REPAIR CEMENT OF MANY USES

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DATA FILE

(Begins on page 169)

368 **Self-Locking Nuts** — Thin locknuts, 1/3 lower in height, designed to meet or exceed minimum Army-Navy tensile requirements for regular-height locknuts are featured in this new 26-pp catalog covering company's full line of locknuts. The thinner nuts can be used in many applications to save weight, space and assembly time. Sizes, fits, part numbers dimensions, tensile values and other information are given. Standard Pressed Steel Co.

369 **Elevated Steel Tanks** — Welded steel tanks with ellipsoidal bottoms and roofs are presented in this 24-pp booklet as an economical means of increasing plant water storage capacity, maintaining uniform pressure. Chicago Bridge & Iron Co.

370 **For Conductometric Determination of Solids**—A quick and simple method for determining solids contents of boiler water or condensate is explained and illustrated in Bulletin TRE50. Hall Laboratories, Inc.

371 **Good Place for Wraps** — Manufacturer's Lockerettes, modern scientific locker units combining best features of both lockers and coat racks are described and pictured in Bulletin 658. Vogel-Peterson Co.

Tear Sheets Available

Readers wishing tear sheets of any article appearing in the issue for their personal file may obtain them by indicating the item desired on one of the post cards appearing in this issue. — **Editors.**

372 **Steam Condensers** — Bulletin 102, 24 pp. is a comprehensive presentation of manufacturer's steam condensers and includes photos of six typical installations as well as a section of engineering data, a discussion of air removal equipment and condenser maintenance. Condenser Service & Engineering Co., Inc.

373 **Plumbing, Heating Supplies** — Edition G is the current edition of this company's 118-pp general catalog on plumbing and heating repair parts, tools and accessories. Indexed and generously illustrated, gives sizes, intended uses and necessary ordering information for items cataloged. J. A. Sexauer Mfg. Co., Inc.

374 **Neoprene Goes to Work** — Eight-pp Bulletin A-18 discusses the properties of Neoprene, showing how they are utilized in products made from this chemical rubber. Covers its toughness, hardness range, air retention, performance under load, at extreme temperatures, flame and chemical resistance. Rubber Chemicals Div., E. I. du Pont de Nemours & Co.

375 **Fundamentals of Hydraulics**—Technical Bulletin B-4 is a 44-pp guidebook covering essential information on hydraulic systems, maintenance, trouble-shooting and selection of proper fluids. Besides offering well-organized reference data for plant engineers, this book is suggested as a training manual for maintenance personnel. It features phantom and cutaway drawings showing functions of basic types of valves, pumps, hydraulic motors, torque converters. Sun Oil Co.

376 **Long Wearing Piston Packing**—Form 4502, 8 pp, presents composition cups for packing pistons of air and hydraulic cylinders and reciprocating pumps. Engineering information covers properties, textures, temperature and pressure data, sizes. Darling Valve & Mfg. Co.

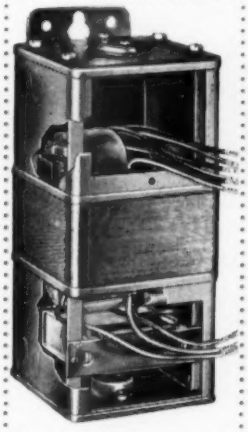
TEN GOOD REASONS

TO SPECIFY JEFFERSON MERCURY LAMP TRANSFORMERS

1. EASY MOUNTING!
Keyhole slots for easy positioning and two holes for locking bolts in both top and bottom brackets. Brackets are reversible or removable for messenger wire suspension, etc.

2. PLENTY OF KNOCKOUTS!
One-half and ¾" knockouts in sides of wiring compartments at each end. Two ½" knockouts in each end plate.

3. INCANDESCENT & MERCURY LAMP LEADS, BOTH ENDS!
For fast, convenient wiring of combination mercury vapor and incandescent lamp fixtures. Mercury lamps can also be wired from either end of transformer.



4. THREE PRIMARY TAPS!
Color-coded tagged leads for positive identification and quick wiring. 3 primary taps (not 2) for close matching with line voltage.

5. DOUBLE VARNISHED CORE & COIL!
Oven baked polymerizing varnish impregnation assures permanent insulation and protection against moisture.

6. INTERCHANGEABLE FITTINGS!
Pryouts on both ends expose standard ½" conduit fittings for suspension type mounting of transformer and/or lamp. ¾" fittings quickly interchangeable.

7. AMPLE WIRING COMPARTMENTS!
Condenser located to provide full wiring space when any knockout is used. Solid U-Bracket mounting prevents vibration damage to condenser and leads.

8. NO OBSTRUCTIONS!
Plenty of wiring room between condenser and conduit fittings. Run wiring through lamp suspension conduit . . . save time, trouble, and outside wiring.

9. PRESS FIT RIVETED CORE!
For positive uniformity of manufacture and maximum quality.

10. TRANSFORMERS FOR EVERY APPLICATION!
Indoors, or out, Jefferson Transformers fill every demand. Normal and high power factor designs. Two lamp types are H.P.F. design. Outdoor types in deep-drawn cases for positive protection against moisture.

THESE EXTRA VALUES ARE YOURS AT NO EXTRA COST!

Only in the new line of Jefferson Mercury Lamp Transformers do you find *all* the extra-value features. You get maximum operating economy, full rated lamp life, and all around lighting satisfaction.

The extra values are yours in every model Jefferson Transformer — yet the cost is no greater than that of the ordinary transformer. Investigate now. There is no obligation.

JEFFERSON ELECTRIC COMPANY
BELLWOOD, ILLINOIS

New 16 page illustrated Bulletin 521-5 gives complete data on indoor and outdoor models for all H-1 400 watt lamps, and on the new Jefferson Transformers for both H-12 and H-15 1000 watt lamps. Write for your free copy now.

Jefferson Transformers

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DATA FILE

(Begins on Page 169)

377 Industrial Leathers — These illustrated data sheets cover company's leather products and include specifications on various types of leather belting. Also give data on leather packings designed for hydraulic and pneumatic equipment. J. E. Rhoads & Sons.

378 Flexible Hose, Bellows — Catalog CMH-123, NPH, 16 pp, describes and gives specifications for manufacturer's line of Flexon bellows and flexible metal hose. Information on metallic bellows of stainless steel, brass, bronze and other alloys is included, covering bellows used in many types of control, regulators and thermostatic devices. A selection guide is provided for steam traps, valves. Flexonics Corp. (formerly Chicago Metal Hose Corp.)

379 Pipe Insulation—Form 76-102 is a small folder stressing efficiency and economy of Amocel, a lightweight asbestos pipe insulation for temperatures to 650 F. Discusses its low thermal conductivity, high mechanical strength in relation to its weight. Union Asbestos & Rubber Co.

380 Engineered Vibration Control—Bulletin 104 presents spring, cork and rubber mountings, discussing advantages of each and use alone or in combination. Provides helpful selection chart covering a wide range of machines, showing recommended and alternate methods of isolation. The Korfund Co., Inc.

381 Fluid Power Circuits—The "Circuit Rider" is a 32-pp pocket-size manual presenting a discussion of basic designs in fluid power circuits together with drawings. Covers air, hydraulic and combination circuits, includes illustrations of JIC symbols. In preparing this manual, company has endeavored to provide a down-to-earth explanation of representative types of fluid power circuits and to show the many possibilities afforded through the use of different types of circuit designs. Logansport Machine Co.

382 Chemical Cleaning Service—Reduced maintenance costs and outage time are among advantages of company's chemical cleaning service for steam equipment and water lines discussed in this 8-pp bulletin. Before-and-after photos show some actual cleaning jobs. Dowell Inc.

383 Hints on Babbitting Practice — In outlying basic steps for the prevention of common bearing failures, Bulletin 146, a little 16-pp booklet, covers everything from the choice of metal for a particular bearing application through the correct pouring practice to in-service maintenance. Proper lubrication, a maintenance schedule, and operation at correct speed and load are discussed. Federated Metals Div., American Smelting and Refining Co.

"Doggone it, Johnson, I thought I told you yesterday to get the lead out!"

384 Hose and Tubing—Catalog CC-400 is a 16-pp illustrated quick-reference booklet on manufacturer's flexible metal hose and tubing. These products are made in two basic types: seamless and strip wound. Catal shows wide range of available alloys and sizes, suggested uses; gives engineering data. The American Brass Co.

385 Production Control Systems, Procedures—Publication X-1268, 56 pp, details a method of material control intended to result in a shorter planning cycle while speeding production by eliminating causes of delay on the production line. Illustrated with typical forms and charts, book outlines procedures for engineering, production planning and progress, machine load, material and tool procurement and control. Remington Rand Inc.

386 Progressive Mechanization in Action—Sixteen-pp Booklet GEA-5789 sets forth a program to help plant engineers step up the mechanization of operations for greater productivity, better products, lower unit cost. Discusses and illustrates this program through stages of hand operation, simple mechanization and improved mechanization to automatic control and continuous process stages, telling which operations would be benefited by the use of machines, greater power, higher speeds. General Electric Co.

387 Valves and Fittings — Illustrated Catalog 47 provides over 60 pp of ordering information and application data on valves and fittings made of stainless steel and other corrosion resistant alloys designed for use where corrosion or contamination are factors. Gate, globe, and angle valves for a wide range of services are presented, also needle valves, sampling valves, screwed and flanged fittings. Design and construction details are shown. Also included is a chart of first and second recommendations of alloys for corrosive media. Alloy Steel Products Co., Inc.

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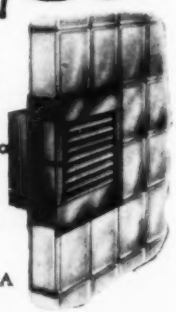

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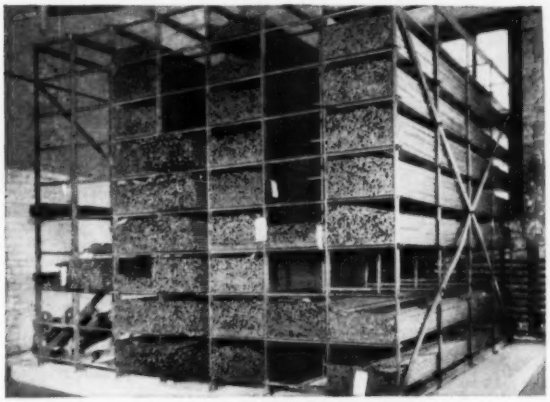

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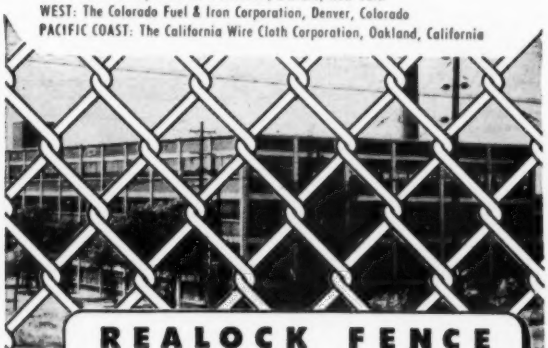

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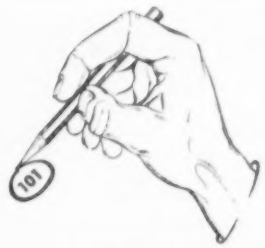
BULLETINS

(Continued from page 168)

167 Milling Machines—Now available is this company's 52-pp 1953 general catalog (Publication M-1776). Fully illustrated, it covers a broad range of machines, giving specifications, application information and special features. Presents milling, lapping, grinding, broaching machines, also die sinking and metal forming machines, and others. The Cincinnati Milling Machine Co.

168 Air Hose—Catalog Section 3460 describes five grades of air hose with tough, oilproof covers to prevent peeling. Specifications are listed and construction described. The B. F. Goodrich Co.



See pages 37-38 and 167-168 for postage-free mailing cards. Use them to ask for bulletins — just circle item numbers of all those wanted.

169 Industrial Layout Tapes—This 6-pp brochure describes a variety of pressure-sensitive tapes representing conveyors, structural components, etc., scaled ¼ in. to the foot. Other tapes in the line consist of lines, reference numbers and letters and colored arrows. Layout boards and grid sheets also listed. Chart-Pak, Inc.

170 Packaged Deaerating Heater—A new spray-type deaerating heater for smaller boiler plants is described in Bulletin WC-110. This compact heater is equipped with all accessories including overflow level control, thermometers, relief and vent valves. Bulletin shows how heater is built, how it works; tells what it's designed to do. Graver Water Conditioning Co.

171 Got Faucet Problems?—"Biography of Mr. Water Faucet" is a little 8-pp booklet written in amusing style but providing a clear and complete discussion on the repairs of faucets. Covers cause and treatment for drippy, noisy and stripped faucets. Economy Valve Seat Co.

172 Junction Boxes—Twelve-pp Bulletin Supplement 130-B covers more than 500 cast iron junction boxes for almost every application. Photos, sectional drawings and specification tables giving dimensions, price and weight of both surface and flush mounted types are provided. O. Z. Electrical Mfg. Co., Inc.

173 How Many Btu's—Instrumentation Data Sheet 10.19-1 describes the operation and application of the Brown Btu meter, which simultaneously records differential temperature and flow of a liquid and provides direct reading of Btu. Brown Instruments Div., Minneapolis-Honeywell Regulator Co.

174 For Metering Natural Gas—Bulletin 1701 tells advantages of installing precision bored tubes in connection with flowmeter orifices. Explains how the precision machine bored meter run gives standardized performance of measurement and permits use of any beta ratio. Dravo Corp.

175 For Improved Oxygen Control—Bulletin 108 presents advantages of manufacturer's Model F-3 oxygen analyzer: automatic operation, high selectivity to oxygen, low maintenance, rugged construction, etc. Explains paramagnetic principle of operation, discusses easily installed components. Arnold O. Beckman, Inc.

176 Mastic Flooring—This illustrated bulletin tells the complete story on company's mastic flooring, discussing its features and telling how to apply it over wood or concrete or as an underlayment. Several installations are pictured, specifications included. Bitucote Products

177 Friction Clutch—Folder 2437, on manufacturer's Beyl friction clutches and clutch couplings, includes schematic drawings and dimensional tables to facilitate selection. Link-Belt Co.

178 Descaling Steel Strip—The descaling of hot-rolled steel strip at high speeds and low cost by airless blasting is described in Bulletin 894. Detailed description of the equipment and its operation. American Wheelabrator & Equipment Corp.

179 Industrial Maintenance—Another booklet in this company's cost reduction training program, this 12-pp text tells how to keep equipment, methods and facilities in top operating condition, how to organize an industrial maintenance program. Also covers features of lighting, air conditioning, color painting, noise and vibration control. Wheeler Associates, Inc.

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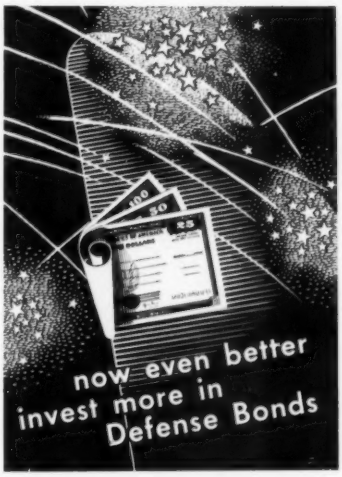

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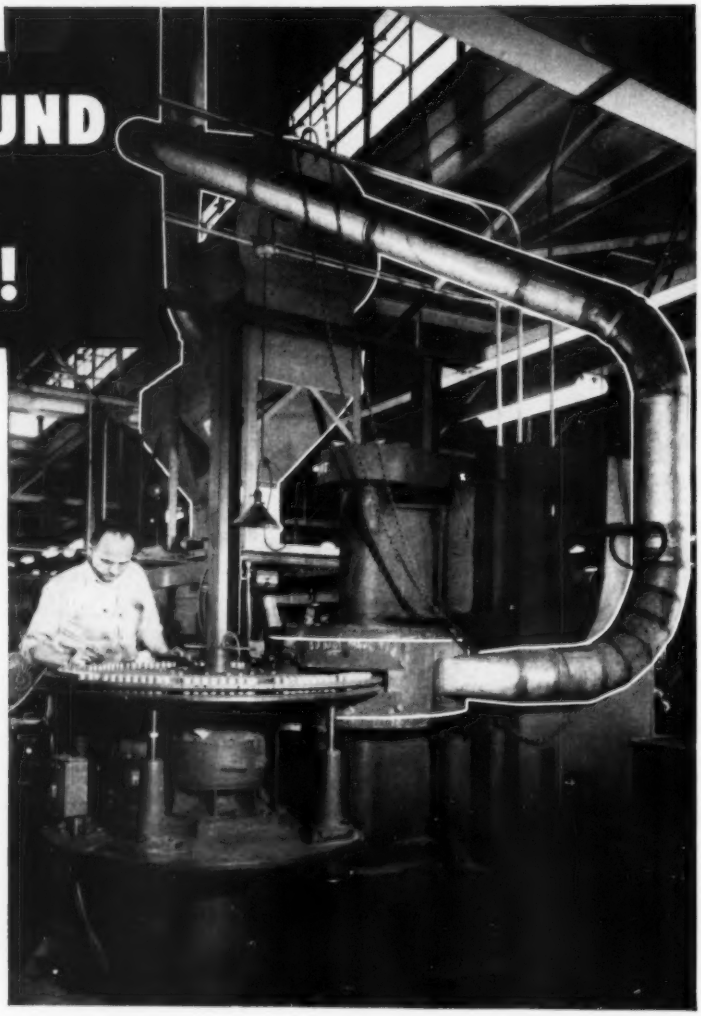
PROVING GROUND FOR PERFECTION!



ROTO-CLONE SCORES CLEAN SWEEP OVER SPRING GRINDING DUST

When it comes to dust control, spring grinding is the "toughie" of metal grinding operations. The load is heavy and the dust is fine. Equipment that can approximate 100% cleaning efficiency here will handle other dust control jobs "in a breeze".

Pictured is a Besly No. 918 Vertical Spindle Disc Grinder. The springs are fed into the unit on a rotating table. The resulting dust is exhausted by a No. 14 Type D ROTO-CLONE* combined with Skimmer Precleaner. Bulk of the dust (85 to 90%), including the more abrasive particles, is removed by the Precleaner. The remaining fines (10 to 15%) are snapped up by the Type D dynamic precipitator. And, to further prove its capacity for work, this ROTO-CLONE "team" (rated at 4500 cfm) does a like job for three more Besly spring grinding operations.

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**ROTO-CLONE is the trade-mark (Reg. U. S. Pat. Off.) of the American Air Filter Company, Inc., for various dust collectors of the dynamic precipitator and hydrostatic precipitator types.*

American Air Filter
COMPANY, INC.
228 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q.

AAF

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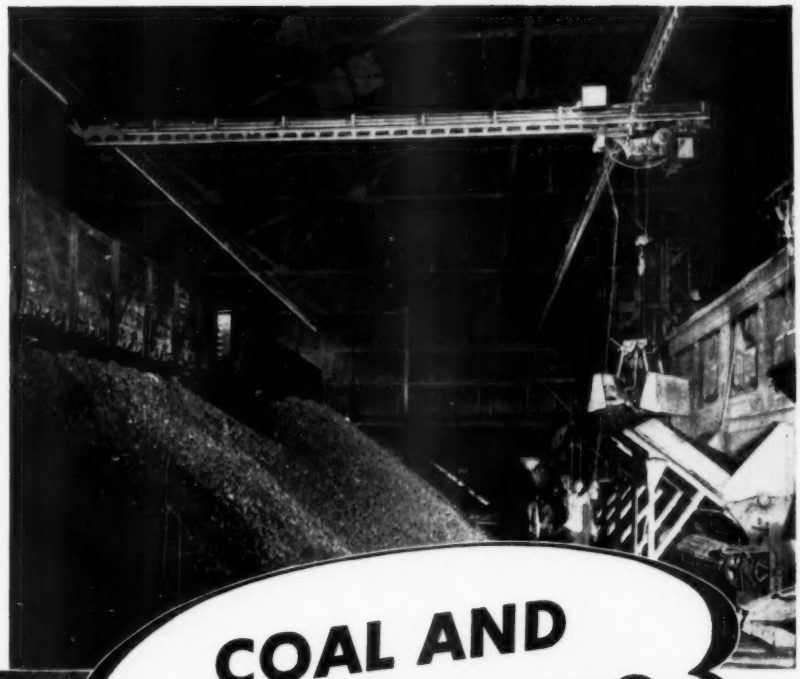
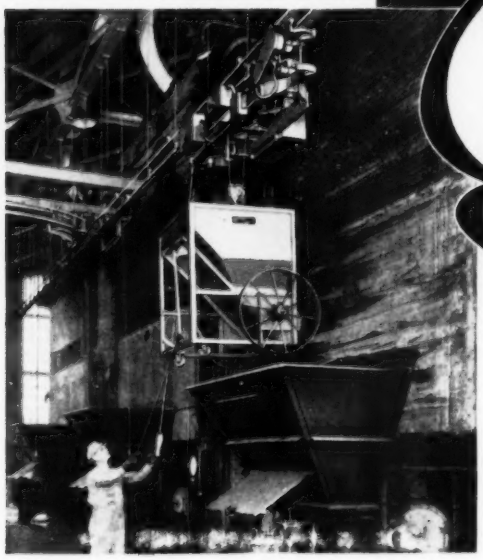
80 to 100 tons of coal are fed every 24 hours to the stoker hoppers of two 340 h.p. and two 560 h.p. boilers in this plant with a motor-driven floor-controlled Cleveland Tramrail crane and one-half yard single line grab bucket.



This bucket is ¼ yard size and carries ½ ton of coal. It is used as shown below.

COAL AND ASH HANDLING MADE EASY



Buckets are rolled under discharge chutes of overhead bin or to outside coal storage and filled. They then are picked up and delivered to stoker hoppers by Tramrail System. Same equipment hauls ashes away.

In many boiler rooms the problem of handling coal and ashes has been simplified by means of a Cleveland Tramrail overhead system. This equipment not only eases the work but cuts costs.

Both overhead cranes and rail systems are used depending upon the application. For large boiler rooms, as illustrated above, grab bucket handling cranes have proven advantageous. Overhead rail equipment as shown at left with electric hoist is in use in many small and medium size plants. One man usually can take care of a boiler room with this equipment and keep it clean and orderly. Inexpensive manually-operated equipment for handling one-half to one ton coal per hour can also be furnished.

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OVERHEAD MATERIALS HANDLING EQUIPMENT

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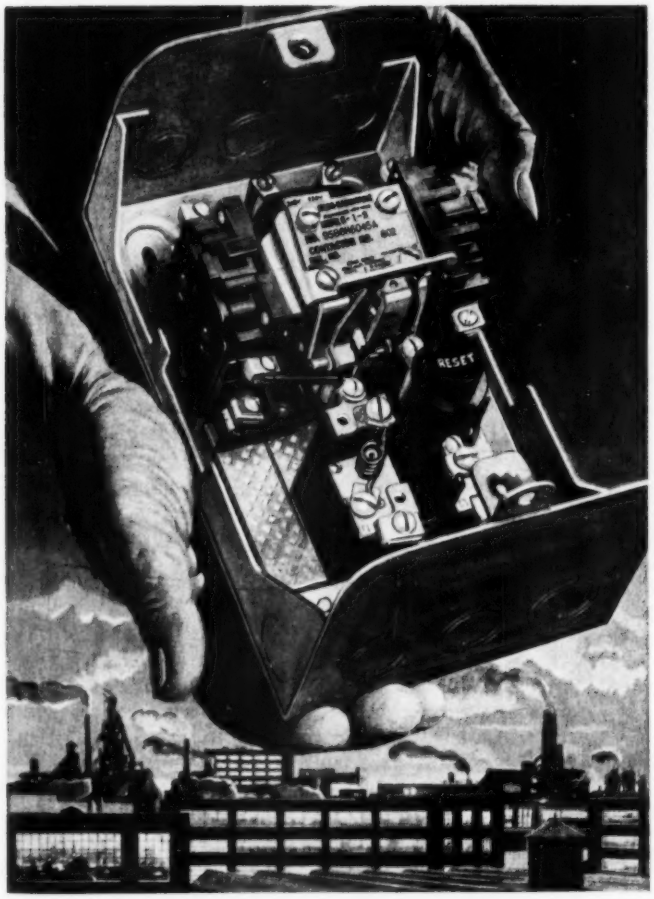
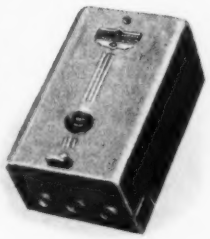
Now CUTLER-HAMMER *proudly presents the spectacular new ☆☆☆ motor control*



Entirely new in concept and design. Wide-open accessibility. Remarkably improved performance. Vastly increased operating life.



This is important news for the men of industry. It marks a new day of improved electric motor performance. A new day of more accurate and more dependable motor protection. A new day of simpler, easier, faster motor control installation. This is the quick story of the spectacular new Cutler-Hammer ☆☆☆ Motor Control. But thousands of words could not tell this story in its important details.

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MOTOR CONTROL
C-H

☆ INSTALLS EASIER

☆ U-shaped cover removes to make working parts easy to see and reach, wide open on both sides and front. Plenty of room and light to see and to work. ☆ Unit plate construction permits removal of entire mechanism by loosening just 3 screws. A dream for quick and easy conduit work and for pulling in wires. ☆ Keyhole mounting slots at top allow hanging starter on previously driven screws. An easy one-man job. ☆ Plenty of wiring space. And straight-through wiring. All line terminals at top, load terminals at bottom. No criss-cross. And every terminal can be reached with a screw driver from the *front*. ☆ Pressure connectors on *all* terminals; no slow and tedious wire looping. ☆ Easily changed magnet coil clearly marked for voltage and frequency. ☆ Many other features.

☆ WORKS BETTER

☆ Positive, guided armature action. Movement on self-cleaning pivot bearings. No sloppy misalignment or sliding frictional drag. Quiet. ☆ Automatic armature kickout assures quick break and prevents false operation due to shock. ☆ Dust-safe vertical contacts stay clean. Heavy duty twin-break to minimize arcing. Fully confined in pressure-quench chambers, yet easily accessible and easily removable. ☆ Famous C-H Eutectic Element overload protection; accurate, simple, dependable. ☆ New 4-position overload heater coils permit adjustment within 3% of actual full load motor rating; dependable protection with fewer needless motor stoppages. ☆ New and exclusive, *three* coil overload protection now available in same standard starter structure and enclosure. ☆ Many other features.

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☆ LASTS LONGER

☆ Lifetime armature pivot bearings eliminate sliding friction and wear. Smooth, quiet, dependable operation is assured over entire life of starter. ☆ Dust-safe vertical contacts stay clean, free from grit and dirt that cause burning and pitting. ☆ New light-weight, movable contact design reduces "bounce"... and the resulting arcing and burning that shortens contact life. ☆ New pressure-quench enclosure of contacts further lengthens contact life. ☆ Vacuum impregnated magnet coil, filled with new solvent-free plastic and polymerized, is moisture-proof and non-softening even under high operating temperatures. ☆ Easy inspection due to "wide-open" construction insures regular care. ☆ Life-time enclosure; baked enamel on heavy Bonderized steel.

MARCH, 1953

Plant Engineering

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